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The Expedition of the Research Vessel "Polarstern" to the Arctic in 2012 (ARK-XXVII/3)

Edited by
Antje Boetius
with contributions of the participants

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2 August - 8 October 2012

Tromsø - Bremerhaven

Chief scientist
Antje Boetius

Coordinators
Eberhard Fahrbach
Rainer Knust

Contents

1. ZUSAMMENFASSUNG UND FAHRTVERLAUF

Antje Boetius
Alfred-Wegener-Institut Helmholtz-Zentrum für Polar- und Meeresforschung

Zusammenfassung

Die Expedition ARK-XXVII/3 „IceArc“ (Sea ice - ocean - seafloor interactions in the changing Arctic) begann am 2. August 2012 in Tromsø, Norwegen. Vierundfünfzig internationale Wissenschaftler und technische Teams haben für über 2 Monate die Biologie, Chemie und Physik des Meereises erkundet, um die Auswirkungen seines Rückgangs auf das gesamte Ozeansystem zu erforschen. Mittels interdisziplinärer Prozessstudien wurde die Wechselwirkung zwischen Hydrographie, Eisphysik, Biogeochemie und Biodiversität des arktischen Systems vom Meereis bis zum Tiefseeboden erforscht. Es wurden eine Reihe von neuen Technologien eingesetzt, mit denen erstmals das Leben der Zentralen Arktis in und unter dem Eis bis in 4.400 Meter Wassertiefe dokumentiert werden konnte. Zudem wurden kurz- und langfristige Verankerungen und Eis-Observatorien ausgetauscht, die ganzjährig die Dicke des Meereises, die Zirkulation des Atlantikwassers und die damit verknüpften Partikelflüsse messen. Dabei hat *Polarstern* rund 12.000 Kilometer zurückgelegt und Untersuchungen an 306 Stationen in Regionen verschiedener Eisbedeckung durchgeführt.

Viele Messungen standen im Zeichen des rapiden Rückgangs des Meereises im Sommer 2012 (Fig. 1.0). Die Surveys mit dem EM Bird von ca. 3.500 km Meereis zeigten, dass nicht nur die Eisfläche sondern auch der Anteil des dicken mehrjährigen Meereises im Untersuchungsgebiet noch weiter abgenommen hat. Insbesondere in der Laptewsee vor Sibirien war schon im Juli 2012 kein Eis mehr vorhanden. Entsprechend hat sich der Süßwassergehalt der Meeresoberfläche durch die Eisschmelze weiterhin erhöht. Mit einem neuartigen Untereis-Schleppnetz konnte erstmals die Lebensgemeinschaft direkt an der Unterseite des arktischen Packeises großflächig beprobt werden. Dabei wurden besonders Tiere wie der Polardorsch untersucht, die speziell ans Leben unter dem Eis angepasst sind. Ein Untereis-Roboter wurde genutzt, um die Lichtmenge und Verteilung von Algen an der Unterseite des Eises aufzuzeichnen. Die dichte Untereis-Rasen bildende Kieselalge *Melosira arctica* wurde erstmals in hohen Konzentrationen auch unter einjährigem Eis in den zentralen Becken gefunden. Bilder aus der Tiefsee zeigten, dass die Algen durch die starke Eisschmelze großflächig zum Meeresboden sanken (Boetius et al. 2013). Atlantikwasser, das in mehreren hundert Meter Tiefe durch die Framstraße in die Arktis einströmt, erhöhte sich weiter in Temperatur und Salzgehalt bis in mehrere tausend Meter Tiefe. Bilder und Messungen vom Meeresboden mit benthischen Freifallgeräten zeigen zum ersten Mal enorme Ansammlungen von Seegurken, Schwämmen, Haarsterne und Seeanemonen, die sich von Meereisalgen ernährten. Die warmen Temperaturen, der Eisrückgang

und die erhöhte Lichtverfügbarkeit unter dem Eis verschieben dabei auch die Saisonalität der zentralen Arktis. Die Produktion und der Export von Algen hat sich gegenüber vorherigen Jahren verfrüht, wie die Ergebnisse aus einjährig-verankerten Sinkstofffallen zeigen. Durch die außerordentlich geringe Eisbedeckung konnte *Polarstern* deutlich später im Jahr als üblich noch weit im Norden operieren. Daher konnten auch Daten zu Beginn der Gefrierperiode gesammelt werden. Die Messungen an neuem und dünnem Eis sind wichtig, da es in der Zukunft wesentlich häufiger auftreten wird. Die Ergebnisse der Expedition tragen damit entscheidend dazu bei, die Auswirkungen von Änderungen in der Meereisbedeckung auf den Arktischen Ozean und seine Ökosysteme zu quantifizieren. Die Expedition endete am 8. Oktober 2012 in Bremerhaven.

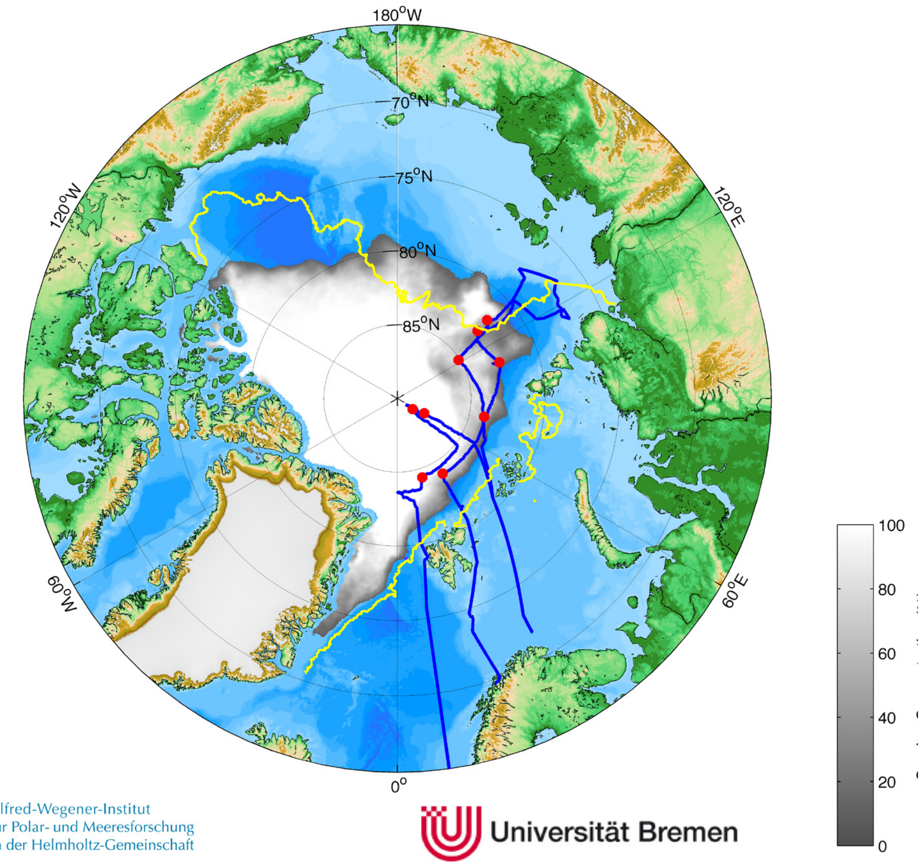

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Fig. 1.0: Cruise track of the "Polarstern" expedition IceArc in 2012. The map shows the low sea ice concentration in September as determined by SSMI. The yellow line shows the 2007 September minimum (Source AWI/Uni Bremen)

FAHRTVERLAUF

Die Expedition „IceArc - Sea ice - Ocean - Seafloor Interactions in the Changing Arctic" (ARK-XXVII/3) begann am Morgen des 2. August in Tromsø, Norwegen. Von Tromsø aus dampften wir 3 Tage in den Norden von Svalbard und ins Eis. Die Stationsarbeiten begannen am Morgen des 5. August um 8:00 mit der Station PS80/199, bei 81°N und 30°E auf dem Barentssee-Schelf in Wassertiefen von 200 m. Im Laufe des 5. August testeten wir alle größeren Geräte im offenen Wasser, einschließlich der benthischen Freifallgeräte (Kammerlander) an einer Verankerungsleine mit Boje. In Abständen von einem halben Grad setzten wir die CTD-Rosette ein, um die hydrographischen und chemischen Bedingungen sowie Primärproduktion und die Zusammensetzung des Planktons zu erfassen. Am Morgen des 7. August erreichten wir bei etwa 82°30'N und 30°E die Eiskante. Bei 84°0.4'N and 30°20'E identifizierten wir eine ausreichend große und dicke Eisscholle, welche die erste Eisstation unserer Expedition IceArc sein sollte und vom 9.-11. August dauerte. Autonome Instrumente wurden an dieser Station für die Dauer der Expedition abgesetzt, um sie am Ende der Fahrt wieder einzusammeln. Die Arbeit an Eisstationen war ein Schwerpunkt dieser Fahrt, und etwa 65% der wissenschaftlichen Fahrtteilnehmer waren daran beteiligt. Eisstationen begannen gewöhnlich mit dem Einsatz dreier benthischer Kammerlander in der Nähe der Eisscholle, um etwa 72 Stunden Inkubationszeit zu gewähren parallel zu den Eisarbeiten. Anschließend ankerte das Schiff an der Eisscholle (Fig. 1.1) um mit ihr zu driften.

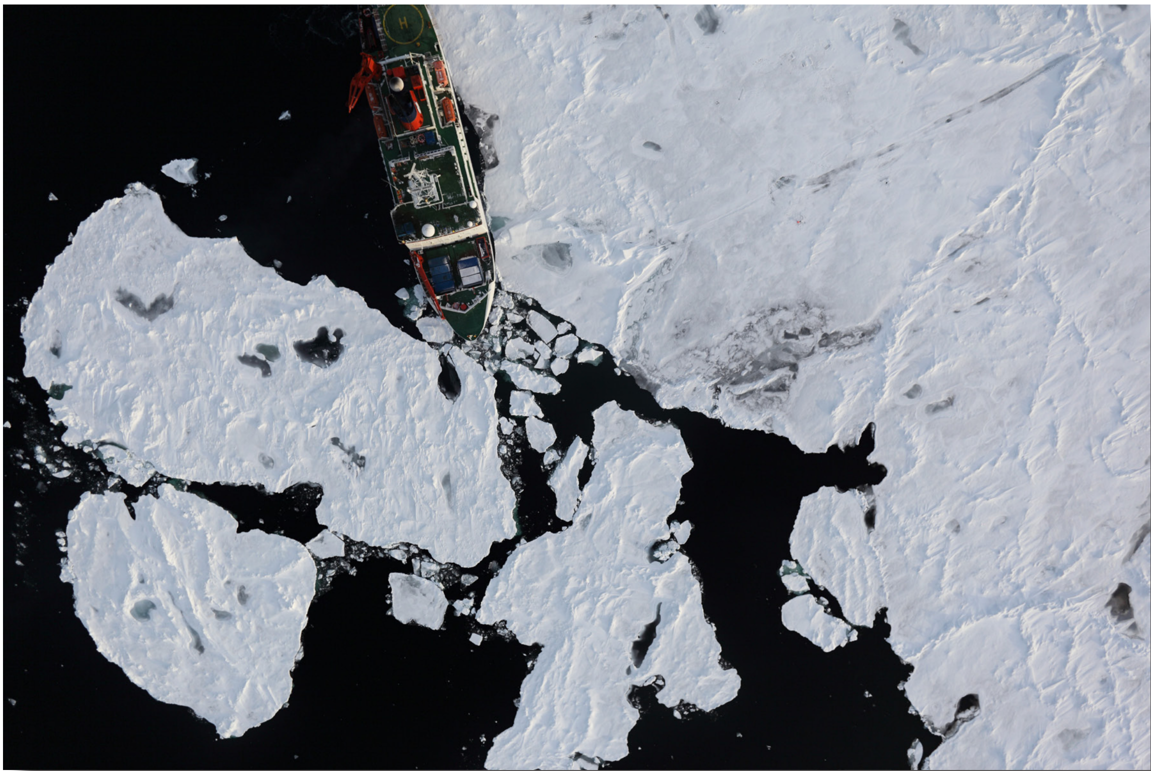

Fig. 1.1 Polarstern legt an einer Eisscholle an (Quelle S. Hendricks)
Fig. 1.1: Polarstern anchors at the ice-floe (Source S. Hendricks)

Alle Winden-betriebenen Geräte wurden dann vom Schiff aus parallel zu den Arbeiten auf dem Eis und teilweise auch in der Luft mittels Helikopter eingesetzt. Für den Einsatz der geschleppten bildgebenden Instrumente wie dem Fotoschlitten OFOS und dem TV-geführten Multicorer wurde die Winddrift des Eises ausgenutzt, welche zwischen 0,1 und 0,5 Knoten betrug. Das Untereis-Schleppnetz SUIT und das Agassiz-Grundschleppnetz wurden jeweils vor oder nach einer Eisstation eingesetzt.

Nach zweitägigem Transit vom 12. bis 13. August mit täglichen CTD und XCTD Einsätzen führten wir vom 14.-17. August unsere 2. Eisstation bei 84°N und 78°E durch. Interessanterweise zeigten die OFOS-Bilder vom Meeresboden in etwa 4.000 m Wassertiefe frisch herabgesunkene Algenklumpen, an dieser und auch an allen folgenden Stationen. Am 19. und 20. August wurden zwei Langzeit-Verankerungen, die vor fast einem Jahr während der Polarstern Expedition ARK 26-3 „TransArc" ausgebracht worden waren, erfolgreich wieder geborgen (Fig. 1.2). Sie waren westlich des Gakkelrückens, im Nansen-Becken bei 3.600 m Wassertiefe ausgebracht worden (82.5°N; 108.5°E). An der dritten Eisstation (20-23.8.; 82.5°N, 109°E) fanden wir noch mehr Algenablagerungen am Meeresboden, sowie üppige Megafauna. Als nächstes wurden drei weitere Verankerungen aus über 4.000 m Wassertiefe im Amundsen-Becken, östlich des Gakkelrückens (83.3°N, 125.2°E), geborgen. Die Aufnahme der letzten Verankerung erforderte zwar lange Suchzeit im Eis mit wiederholtem Eisbrechen, aber alle Geräte konnten sicher geborgen werden. Neben ozeanographischen Geräten, welche die Hydrographie von Tiefenwassermassen in der Arktis erfassen sollen, umfassten die insgesamt 5 geborgenen Verankerungen auch zwei Sedimentfallen, die 200 m unter der Wasseroberfläche und kurz über dem Meeresboden angebracht waren zur Messung des Partikelexports aus der produktiven Oberflächenschicht des Ozeans in die Tiefsee.

Fig. 1.2Bergung der Verankerungen am Gakkelrücken (Quelle H. Sander)

Fig. 1.2: Recovery of moorings from the Gakkel Ridge (Source H. Sander)

Die vierte Woche der Expedition IceArc begann mit der vierten Eisstation vom 26.-28. August bei 82.5°N and 130°E. Am 29. August verließen wir das Eis für einen Ausflug zum Laptewsee-Kontinentalhang, um dort zwei Zeitreihen-Transekte entlang von 130° and 120°E mit CTD und TV-Multicorer Einsätzen zu beproben. Die Transekte erstreckten sich vom Kontinentalfuß bei 3.500 m bis zur Laptewsee Schelfkante bei 60 m Wassertiefe. Zusätzlich hatten wir gehofft für das Russisch-

Deutsche Laptewsee-Projekt weitere Langzeit-Verankerungen am äußeren Laptewsee-Schelf bergen zu können (30.08.-01.09.). Alle vier Verankerungen konnten zwar mit dem Hydrophon lokalisiert werden. Da sie aber ihre obere Auftriebsboje verloren hatten, waren sie vermutlich zum Meeresboden gesunken. Nur eine der Verankerungen konnte durch Dredschen erfolgreich geborgen werden. Die fünfte Woche der Expedition begann mit der Bergung unserer drei bentischen Landersysteme, die nicht weit von der Eiskante im offenen Wasser ausgesetzt waren, bei 79.7°N 130.5°E und 3500 m Wassertiefe (03.09.). Einen Tag später erreichen wir die fünfte Eisstation (04.-05.09.) bei 81.7°N and 131°E – immer noch in vorwiegend dünnen, einjährigen Eis, mit großen offenen Flächen zwischen den Eisschollen.

Anschließend dampften wir weiter Richtung Norden, um bei etwa 85°N ins mehrjährige Eis zu gelangen. Am 7. September wählten wir eine mehrjährige Eisscholle aus, welche die 6. Eisstation bei 85°N and 124°E markieren sollte. Als erstes brachten wir die benthische Lander wieder aus (Fig. 1.3) und begannen als mit den Eisstations-Arbeiten. Bedauerlicherweise ereignete sich bei einem Routine-Sicherheitsmanöver mit einem der *Polarstern* Rettungsboote ein Unfall mit Verletzungsfolgen. Neben einigen leichteren Abschürfungen brach sich ein Fahrtteilnehmer den Arm und das Handgelenk und musste an Land gebracht werden für die operative Nachsorge des Knochenbruchs. Wir schlossen die 6. Eisstation am Morgen des 10. September ab und dampften zurück nach Kirkenes. Nach einem Transit von 3.5 Tagen durch rauhe See erreichten wir die nordnorwegische Küste am frühen Morgen des 14. September. Zum Glück waren die Wetterbedingungen gut und der Verletzte konnte per Helikopter an Land transportiert werden. Gegen Mittag dampften wir dann schon wieder nordwärts. Am Sonntag, den 16. September gelangten wir zurück an die Eiskante bei 84°N und 60°E, und der Umweg nach Kirkenes war offiziell beendet. Wir dampften so schnell wie möglich weiter Richtung Norden, unserer nächsten geplanten Eisstation bei 88°N and 60°E entgegen. Auf dem Weg überquerten wir eine riesige Struktur am Meeresboden: den Karasik Seamount südlich des Gakkelrückens bei 86°N und 60°E, über den wir ein Hydrosweep Transekt legten. Am Dienstag trafen wir an unserer 7. Eisstation bei 88°N and 60°E ein (18.-19.9.). Diese war nur als kurze Station von 30 Stunden geplant, ohne Landereinsätze. Anschließend folgte der weitere Transit nach Norden, um vor dem Ende der Woche noch den Nordpol zu erreichen (20.-21.9.). Unser Ziel war es, die ersten in situ Messungen in der Tiefsee bei 90°N und > 4100 m Wassertiefe durchzuführen, und hochauflösende Bilder vom Meeresboden zu erhalten. Aber durch starke Südwinde, die das Eis zusammendrückten, und eine beträchtliche Schneebedeckung sank unsere durchschnittliche Transitgeschwindigkeit auf 1-2 kn. Nur 45 Seemeilen vom Nordpol entfernt blieb *Polarstern* mehrfach innerhalb von 24 h im Eis stecken. In den frühen Morgenstunden des Freitags (21.9.) mussten wir unser Vorhaben einer Forschungsstation am Pol aufgeben. Wir drehten auf 50°E Länge ab und fuhren wieder Richtung Süden, um eine weitere Eisstation in mehrjährigem Eis durchzuführen. Die 8. Eisstation fand vom 22.-24. September bei 88°49’ N und 58°E statt, die Lufttemperatur fiel bereits unter -12°C und Schmelztümpel froren über. Unsere achte und nördlichste Eisstation endete am 23. September mit einem aufregenden Experiment: dem Aussetzen unsere Freifall-Lander an einem Seil. Die Eisbedingungen an dieser Station waren zu schwierig für einen autonomen Einsatz. Die Lander mit ihren Gewichten und Auftriebskörpern wurden ausgebracht und waren die ganze Zeit über ein Seil mit dem Schiff verbunden, welches bis in über 4 km Wassertiefe reichte; zusätzliches Seil musste mit der Drift ausgebracht

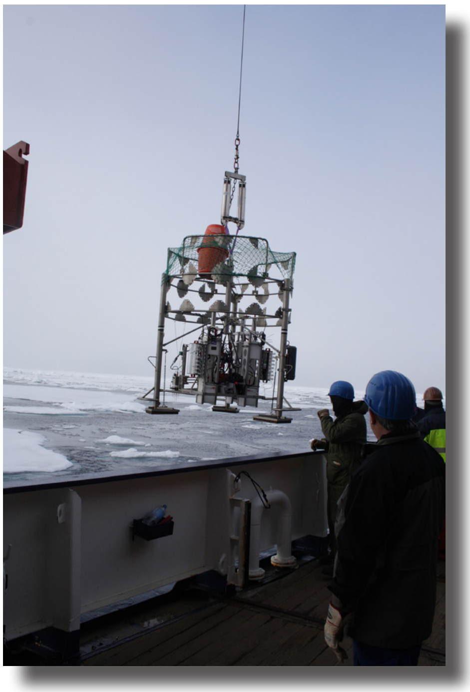

Fig. 1.3: Aussetzen der benthischen Lander im Eis. (Quelle F. Wenzhöfer)

Fig. 1.3: Deployment of benthic landers in the ice (Source F. Wenzhöfer)

werden. In den frühen Morgenstunden des 24. September wurden die Lander erfolgreich wieder an Deck geholt, mit erfolgreichen Messungen und Proben.

Dann starteten wir das letzte CTD Transekt Richtung Süden, entlang von 52°E Breite, mit 10 geplanten CTDs zwischen dem 24. und 29. September, in Richtung von 84°45'N. Am 27. September schlossen wird dieses Transekt ab und dampften zur letzten Eisstation bei 84°22'N und 17°30'E. Die GPS Positionen der am Anfang der Expedition ausgesetzten Bojen führten das Schiff direkt an die richtige Stelle. Alle Geräte konnten geborgen und die Daten ausgelesen werden – außer einer Sedimentfalle, die vom Eis abgerissen war. Die 9. und letzte Eisstation dauerte bis zum Abend des 29. September an, und endete mit einem erfolgreichen Einsatz des SUIT Untereis-Schleppnetzes (Fig. 1.4).

Zu diesem Zeitpunkt hatten wir eine e-mail vom Forschungs-Hovercraft RH *Sabvabaa* bekommen, welches um *Polarsterns* Unterstützung bat. Bei 83°44'N und 02°36'W kam es auf seinem Rückweg nach Svalbard nicht voran, da Winde die dünnen Eisschollen zu Aufschüttungen zusammengepresst hatten und zusätzlich tiefhängende Wolken und Nebel white-outs verursachten. Wir bekamen die Genehmigung das RH *Sabvabaa* zu bergen und auf Rückreise nach Spitzbergen mitzunehmen. Wir erreichten das Hovercraft am 30. September, bei 83°41'N, 00°17'W. Bis Mitternacht war es auf das Helikopter-Deck der *Polarstern* gehievt worden (Fig. 1.5). Anschließend dampften wir in südöstlicher Richtung zur Eiskante nördlich von Svalbard und verließen das Eis am Morgen des 2. September. Das RH *Sabvabaa* wurde am 2. Oktober um 20:30 vor dem Kongs-fjorden (Svalbard) wieder ins Wasser gesetzt. Der Transit zurück nach Bremerhaven dauerte bis zum 8. Oktober und

Fig. 1.4: Das SUIT Untereis-Schleppnetz wird ausgesetzt (Quelle B. Rabe)

Fig. 1.4: The SUIT under ice trawl is deployed (Source B. Rabe)

Polarstern machte um 6:00 wieder am Pier in Bremerhaven fest. Die Expedition war trotz des bedauernswerten Unfalls ein voller Erfolg, im Namen aller Fahrtteilnehmer bedanken wir uns beim Kapitän und der Crew der *Polarstern* für die hervorragende Unterstützung bei den Arbeiten auf See und die freundliche Zusammenarbeit während der Expedition IceArc (ARK-XXVII/3).

Fig. 1.5: Das Hovercraft RH Sabvabaa auf Polarstern (Quelle S. Hendricks)
Fig. 1.5: The hovercraft RH Sabvabaa on Polarstern (Source S. Hendricks)

Fig. 1.6: Gruppenfoto der Expedition IceArc (ARK-XXVII/3)
Fig. 1.6: Group photo Expedition IceArc (ARK-XXVII/3)

SUMMARY AND ITINERARY

The expedition ARK-XXVII/3 “IceArc” (Sea ice - ocean - seafloor interactions in the changing Arctic) started 2 August 2012 in Tromsø, Norwegen. Fifty-four international scientists and technical teams investigated the biology, chemistry and physics of sea ice and the impact of sea ice loss on the entire Arctic Ocean system. The expedition IceArc has focused on the interactions between hydrography, ice physics, biogeochemistry and biodiversity in the Arctic system, from the sea ice to the deep-sea floor, using a number of new technologies for under ice research. By integrated process studies, sites in the central Arctic with varying ice cover were compared. Ice-, ocean- and seafloor moorings were deployed to observe sea ice thickness, circulation of Atlantic water and corresponding particle flux throughout the year. *Polarstern* traveled 12,000 kilometers and completed 306 stations during the mission.

Many of the measurements carried out dealt with the consequences of the shrinking sea ice forming a new minimum in summer 2012 (Fig. 1.0). Surveys with the EM Bird system of 3,500 km sea ice showed that not only the ice cover has further declined but also ice thickness. The entire Laptev Sea area was ice free in July 2012. Accordingly, the surface waters showed a considerable proportion of melt water. A new under-ice-trawl was used to study the distribution of ice-associated fauna like the polar cod. An under-ice ROV recorded light and energy transmission as well as oceanographic parameters and the distribution of sub-ice algal communities. Dense sub-ice aggregations of the diatom *Melosira arctica* were found for the first time also under first year ice in the Central Arctic basins. Deep-sea photo- and video-surveys showed that these algae had sedimented to the seafloor as a consequence of the large ice melt in 2012 (Boetius et al. 2013). Measurements with benthic landers under the ice showed high respiration rates fueled by the fresh algal deposits, and aggregations of mobile megafauna feeding on the algae, including ophiurids and holothurians. Oceanographic transects found a further warming and salting of deep Atlantic water. The warm atmospheric temperatures, sea ice decline and increasing light availability had shifted the productive period to earlier in the year, as indicated by sediment traps recovered with long term moorings. Because of the substantial sea ice retreat, *Polarstern* was able to operate far north in September, supporting measurements of the freeze-up of thin, new ice, which will form a significant proportion of the future Arctic sea ice. Results of the expedition IceArc will help to better understand and quantify the effects of changes in sea ice cover on the Arctic Ocean and its ecosystems. The expedition ended 8 October 2012 in Bremerhaven.

Cruise Narrative

The expedition „IceArc - Sea ice - Ocean - Seafloor Interactions in the Changing Arctic" (ARK-XXVII/3) started in the morning of the 2nd August in Tromsø, Norway. We steamed 3 days from Tromsø to North of Svalbard into the ice. Station work started the morning of 5 August at 08:00 with station PS80/199, at 81°N and 30°E on the Barents Sea Shelf, at water depths of 200 m. During 5 August we tested all larger equipment in open water, including the procedure for deployment and recovery of the benthic lander system attached to a rope and surface buoy, for recovery in ice. We continued sampling every half-degree latitude with the CTD-rosette for assessing the hydrographical and chemical conditions as well as primary production and the composition of the plankton. We arrived at the ice edge at about 82°30'N und 30°E in the early morning of 7th August. A large ice floe was identified at 84° 0.4'N and 30°20'E for the first ice station of Expedition IceArc, lasting from 9 - 11 August. Autonomous instruments were deployed for the duration of the expedition, to be recollected at the end of the mission. Ice stations are a main focus of the expedition, involving 2/3 of the science party. They started with the deployment of three benthic chamber lander systems close to the ice floe, which need incubation times of 72 hours. Then the ship anchored at the ice floe (Fig. 1.1) and drifted along, and all other winch-operated instruments were deployed in parallel to the work on the ice and in the air. Survey instruments like the photo sledge OFOS, and the TV-guided multiple corer were operated exploiting the wind-drift of the ice between 0.1 and 0.5 knots. The under-ice trawl SUIT and the Agassiz bottom trawls were deployed before or after the ice station.

After a two day transit from 12 - 13 August with daily CTDs and XCTDs we carried out the second ice station on 14 - 17 August, at 84° N and 78°E longitude. Interestingly, the OFOS images from the seafloor showed clumps of freshly deposited in almost 4,000 m water depth at this and all subsequent ice stations. On 19 and 20 August, two long-term moorings deployed almost one year ago by *Polarstern* expedition ARK-XXVI/3"TransArc" were successfully recovered (Fig. 1.2). They were deployed west of the Gakkel Ridge, in the Nansen Basin at 3,600 m water depth (82.5°N; 108.5°E). At the third ice station (20-23. 8.; 82.5°N, 109°E), even more algal deposits are observed at the deep sea floor as well as abundant megafauna. Next, three further moorings were recovered from over 4,000 m deep in the Amundsen Basin, east of the Gakkel Ridge (83.3°N, 125.2° E). The recovery of the last mooring from ice rubble needed a lot of ice-breaking and searching, but all was safely retrieved. Besides oceanographical equipment to assess the hydrography of deep-water masses in the Arctic, the 5 moorings recovered included 2 sediment traps deployed at 200 m below surface and above the seafloor, to assess particle export from the productive ocean layers to the deep sea.

The fourth week of the Expedition IceArc included the fourth ice station from 26 - 28 August at 82.5°N and 130°E. On 29 August we left the ice for an excursion to the Laptev Sea continental margin, to sample two time series sections along 130° and 120°E with CTD casts and TV-Multicorer. These transects spanned from the continental rise at 3500 m to the Laptev Sea shelf edge at 60 m. In addition we had hoped to recover long-term moorings on the outer Laptev shelf for the Russian-German Laptev Sea-Project (30.08.-01.09.). All four moorings were located by the hydrophone, but since they had lost their top flotation buoy, they apparently collapsed at the seafloor.

Only one was recovered successfully by dredging. The fifth week of the expedition started with the retrieval of our three benthic lander systems deployed in open water not far from the ice edge, at 79.7°N 130.5°E, and 3,500 m water depth (03.09.). A day later we reached the next ice station #6 (04.-05.09.) at 81.7°N and 131°E – still in mostly thin first year ice, with large openings between the floes.

We then steamed further north to reach the multiyear ice at around 85°N. On 7 September we selected a multiyear ice floe, marking the 6th ice station at 85°N and 124°E. First we re-deployed the benthic landers (Fig. 1.3), next was the ice-station work. But unfortunately, during a routine safety exercise with one of *Polarstern*'s rescue boats, an accident occurred and several people were hurt. Besides some smaller injuries, one cruise participant broke his arm and wrist, and needed a transfer to a hospital on land. We finalized the 6th ice station in the morning of 10 September and then steamed back to Kirkenes. After a transit of 3.5 days in rather rough seas, we reached the coast of northern Norway in the early morning of 14 September, luckily with good weather conditions for the transfer by helicopter. Already around noon we steamed northwards again. On Sunday 16 September we were back at the ice edge at 84° and 60°N, and the deviation to Kirkenes was officially terminated. We steamed further north as fast as possible, towards our next planned ice station at 88°N and 60°E. On the way we crossed an intriguing giant seafloor structure: The Karasik Seamount south of the Gakkel Ridge at 86°N and 60°E over which we added a hydrosweep track. On Tuesday we arrived at our 7th ice station (18. - 19.9.) at 88°N and 60°E. It was planned as a short station of only 30 hours, without lander deployments. Next was the transit north, to reach the North pole before the end of the week (20. - 21.9.). Our goal was to achieve the first deep sea *in-situ* measurements at 90°N and > 4100 m water depth, and to provide high resolution seafloor images. But due to southerly winds strongly compressing the ice-floes, and a substantial snow cover, the average travel speed dropped to 1 - 2 kn, and just 45 miles away from the pole, the ship got stuck in the ice several times in 24 h. In the early morning hours of Friday (21.9.) we had to give up on reaching the Pole and turned south on 50° E longitude, to carry out another ice station in multiyear ice. The 8th ice station took place at 88° 49′ N and 58°E from 22 - 24 September, with air temperatures already dropping below -12°C and frozen melt ponds. Our eighth and northernmost ice station ended on 23 September with an exciting experiment: the deployment of our free falling lander on a rope. Ice conditions at the site were too difficult for an autonomous deployment. We deployed the lander with weights and floatation on a rope connected to the ship at over 4 km water depth, and paid out further rope with the drift. In the early morning hours of 24 September, the lander was successfully retrieved back on deck, with highly interesting data.

Then we started the last CTD transect southwards, along 52°E longitude, with 10 CTDs planned from 24 - 27 September towards 84° 45′N. On 27 September we completed this transect and steamed to the final ice station at 84°22′N and 17°30′E. The GPS positions of the buoys led the ship directly to the spot. All instruments could be recovered and the data retrieved – except from one sediment trap which was torn off by the ice. The 9th and final ice station lasted until the evening of 29 September. It ended with a successful SUIT under-ice trawl (Fig. 1.4).

At that time we had received an email from the research hovercraft RH *Sabvabaa*, asking for support by *Polarstern*. Its position was 83° 44′ N and 02° 36′ W, and it could not make progress during its return trip to Svalbard, as winds had pressed the thin ice floes to rubble fields, and low clouds and fogs caused white-outs. We obtained the permission to assist the RH *Sabvabaa* by retrieving it, and managed to reach it on 30 September, at 83° 41'N, 00° 17'W. By midnight it was lifted onto *Polarstern*'s helicopter deck (Fig. 1.5). We then steamed in southeastern direction towards the ice edge north of Svalbard, and left the ice in the morning of 2 October. The RH *Sabvabaa* was lifted back into the water outside Kongsfjorden, Svalbard, at 20:30 hours on 2 October. The transit back to Bremerhaven took until 8 October at 6 am, when *Polarstern* anchored at the pier in Bremerhaven.

We thank Captain Uwe Pahl and his crew of *Polarstern* for the excellent support during the work at sea, and the friendly cooperation during expedition IceArc (ARK-XXVII/3).

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2. WEATHER CONDITIONS DURING ARK-XXVII/3

Max Miller[1], Juliane Hempelt[1]   [1]DWD

On Thursday, August 2, 2012 (11:15 am), *Polarstern* left Tromsø for the campaign ARK-XXVII/3 at light and variable wind, broken clouds and 12°C.

A weak low off Norway moved towards a position east of Svalbard. During the first part of our way north it caused westerly wind at 4 to 5 Bft, some showers and a swell around 1 m. Later on we got at the northern edge of the low and the wind veered northeast. For short times it increased up to Bft 6. From Wednesday (Aug. 8) on only weak pressure gradient was prevailing. During the measurements on an ice flow fog was the biggest problem.

During transit towards another ice flow at 84° N 78° E the wind increased. A low near Severnaya Zemlya intensified and moved towards Kara Sea. Its sector of strong winds passed *Polarstern* during the night to Tuesday (Aug. 14) with Bft 7 from north. On Tuesday afternoon the wind abated to 5 Bft. Visibility improved temporarily, but some showers were present. Already on Wednesday (Aug. 15) mist and low stratus again were the dominant features at abating wind. On Thursday fog became thicker and flight operations impossible.

On Sunday (Aug. 19) a low north of Greenland moved towards Barents Sea. On Monday we got at its eastern edge. The south easterly wind increased and reached its maximum during the night to Tuesday (Aug. 21) at Bft 7. On Wednesday (Aug. 22) the low weakened and *Polarstern* left it on its way east entering a weak ridge. Therefore wind abated in the evening to Bft 4 and flight conditions improved temporarily. But soon a low over Bering Strait moved north a bit and built a trough towards our area. From Thursday (Aug. 23rd) on grey sky with some rain dominated the weather over Laptev Sea. Only for short times wind increased up to Bft 5.

From Sunday (Aug. 26) on a high formed near Novaya Zemlya and we operated at its eastern edge. The well known mixture of weak wind, mist, fog, low stratus and some sunny moments persisted.

From Thursday (Aug. 30) on a storm over Fram Strait moved north and weakened slowly. During the night to Saturday (Sep. 1) a first trough caused westerly winds at Bft 6 and some rain over Laptev Sea. The low moved on via North Pole towards East Siberian Sea and passed our operation area (80° N 130° E) during the night to Tuesday (Sep. 4). The south westerly wind reached its maximum at Bft 7. On Tuesday the wind veered northeast and abated.

The former tropical storm "Kirk" had reached Norway and weakened on its further track towards Barents Sea. It built a trough towards North Pole. On Wednesday (Sep. 5) we got at the northern end of the trough. The wind veered southwest and increased up to Bft 6. On Thursday (Sep. 6) the centre of the trough passed us and wind abated. A high over the Queen Elizabeth Islands moved north and then towards the New Siberian Islands. Therefore *Polarstern* (85° N 122° E) was located between this high and the low over Barents Sea. The southerly wind increased steadily up to Bft 6 on Sunday (Sep. 9). We often had misty or foggy conditions and flight operations could hardly been carried out.

On Monday (Sep. 10) the transit to Kirkenes started. The high near the New Siberian Islands had built a ridge towards the Kola Peninsula. First we travelled this ridge. The wind hardly reached Bft 4 and fog was the dominant feature. From Wednesday (Sept. 12) on we approached a low over the Norwegian Sea. The southerly wind increased. On Thursday (Sep. 13) it veered southeast at Bft 7 while visibility improved. During the night to Friday an occlusion front crossed *Polarstern*. Therefore on Friday morning (Sep. 14) the flight conditions were good. Already a few hours later we could steam back north. The weather situation did not change and for the next two days we observed south easterly wind at Bft 6 to 7 within Barents Sea.

On Monday (Sep. 17) a high over Laptev Sea built a ridge towards North Pole. We entered this ridge and the southerly wind abated. From Tuesday (Sep. 18) on we observed only light and variable wind. Finally the ridge formed a separate high near North Pole. Especially on Sunday (Sep. 23) sky cleared up and temperature dropped below -10°C.

A low over Beaufort Sea moved towards North Pole and reached *Polarstern*. On Wednesday (Sep. 26) the wind veered west and increased up to Bft 6. Soon the low weakened and on Thursday wind abated. At the same time a small high over Greenland Sea moved to Svalbard and became the dominant feature during the last days in the ice.

A strong low off Norway covered the whole route back to Bremerhaven. On Tuesday (Oct. 2) we reached its northern end near Svalbard. The wind from northeast to east increased steadily up to Bft 6. But along the west coast under the lee of the island wind abated to Bft 2 to 3. Until late Thursday evening north easterly wind was prevailing and increased temporarily up to Bft 7 to 8. Crossing the low's centre we observed at times only light and variable wind. On Friday (Sep. 5) wind veered south to southwest around Bft 5. On Saturday the low moved east, the wind veered northwest and increased. Within the North Sea we had a tail wind at Bft 7 to 8. On Sunday evening the low weakened and wind abated.

On Monday morning, October 8 2012, *Polarstern* reached the Harbour of Bremerhaven at northwest to west 4 to 5 Bft.

3. SEA ICE PHYSICS

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3.1 Airborne sea ice surveys

Objectives

The magnitude of the minimum summer sea ice extent is mainly controlled by its thickness distribution at the start of the melting season. The increasing loss of ice volume in the recent decade is manifested in a series of record lows of summer ice extent, but its magnitude is poorly quantified due to a lack of ice thickness information by remote sensing data. Satellite data of ice thickness exists mostly from the spring or late autumn period when the ice surface is cold and altimeters can be used to estimate its height above the water surface to estimates its thickness. The ice thickness distribution during the melting season can only be measured during ship cruises preferably with airborne surveys to minimize a ship route selection bias. Sea ice thickness data obtained by electromagnetic induction (EMI) data measured during *Polarstern* cruises in the Transpolar Drift exist from 1991 on and with airborne electromagnetic (AEM) data since 2001. The objective of airborne survey during IceArc is to continue this time series with additional documentation of the ice surface parameters.

Work at sea

We used airborne electromagnetic (AEM) induction sounding to measure sea ice thickness by helicopter surveys. The instrumentation consists of 4 m long sensor which is towed on a 20 m long cable at an altitude between 10 and 15 m above the ice surface. The method utilizes the difference of electrical conductivity between sea ice and sea water to estimate the thickness of sea ice including the snow layer if present. The surveys were conducted with two AEM sensors. The primary system was equipped with additional instrumentation like an aerial nadir camera and an Inertial Navigation System. The second sensor was used as a backup system without the capability to obtain aerial imagery. The nadir aerial imagery shall enable the classification of ice surface properties. The primary AEM sensor was equipped with a nadir looking Canon EOS 5D MkII digital camera. The internal timestamp of the camera was synchronized with the GPS timestamp of the AEM sensor to use sensor attitude and altitude information to create a geo-reference for each image.

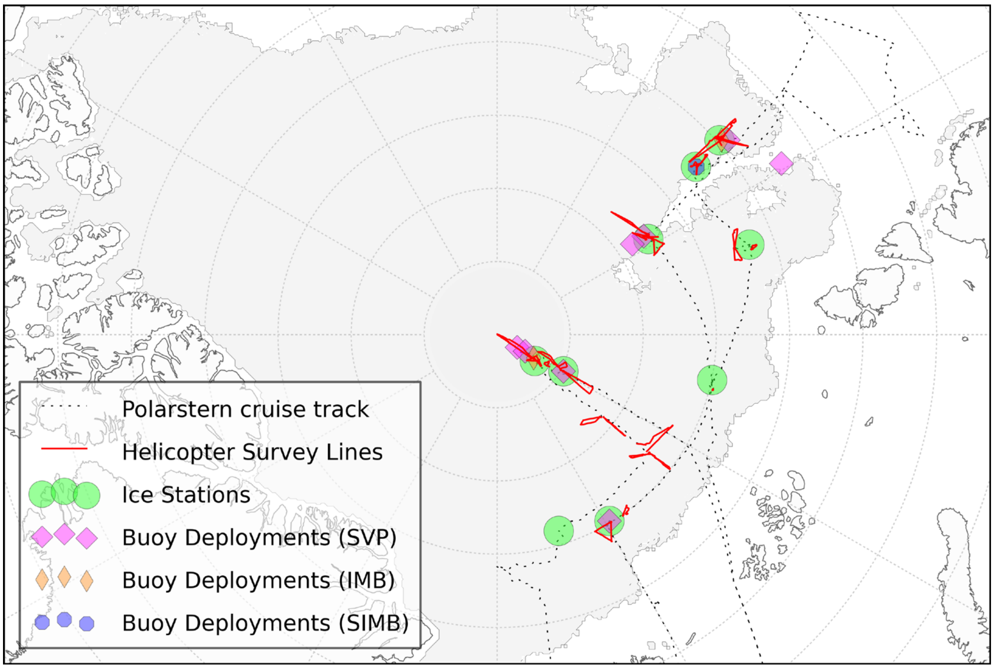

Fig. 3.1: Working program of the Sea Ice Physics group consisting of ice station work, helicopter surveys and buoy deployments. Sea ice extent (kindly provided by IUP Bremen in near-real-time) from Sep. 1 is illustrated as grey shaded area

Preliminary results

The survey work amounted to 21 science flights with more than 3,500 km of profile data. Flight operations were significantly hampered by weather conditions with low cloud and fog in the first half the cruise. Therefore, flights are spaced by several days and scattered in the marginal ice zone (Fig. 3.1, Table 3.1). In the second part of the cruise colder temperatures lead to better flying conditions and the majority of sea ice thickness data along the 60°E transect to the central Arctic. After processing the ice thickness data will be available as point data with an average spacing of 3 to 4 meters and a footprint of approximately 40 m. The availability of aerial images depends on light conditions during the flight and the used sensor systems. After 23 September no aerial images were collected due to a failure of the central data acquisition system of the primary AEM sensor, which had to be replaced with a backup system. In total 1,743 images were shot from ice surfaces including aerial mapping of the ice stations. Depending on altitude, the images cover an area from below to several hundreds of meters.

Tab. 3.1: List of airborne EM (AEM) sea ice thickness and aerial imagery survey flights

Station	Gear	Longitude	Latitude	Comment	Start Date	Start Time	End Date	End Time
PS80/HELI-8	AEM	31,3816	84,0074	ID: maisie_20120810_01	10.08.2012	07:49	10.08.2012	09:04
PS80/HELI-12	AEM	35,6050	83,9940	ID: maisie_20120812_01	12.08.2012	07:52	12.08.2012	08:31
PS80/HELI-15	AEM	75,7497	83,9074	ID: maisie_20120816_01	16.08.2012	17:23	16.08.2012	17:48
PS80/HELI-20	AEM	110,0830	83,0880	ID: maisie_20120822_01	22.08.2012	07:49	22.08.2012	09:35
PS80/HELI-22	AEM	108,4283	82,6585	ID: maisie_20120822_02	22.08.2012	20:10	22.08.2012	20:36
PS80/HELI-26	AEM	129,8587	82,8796	ID: maisie_20120826_01	26.08.2012	11:55	26.08.2012	13:27
PS80/HELI-33	AEM	131,0436	81,9241	ID: maisie_20120904_01	04.09.2012	12:32	04.09.2012	13:00
PS80/HELI-35	AEM	130,8247	81,8882	ID: maisie_20120905_01	05.09.2012	07:24	05.09.2012	08:59
PS80/HELI-37	AEM	130,8796	81,8769	ID: maisie_20120905_02	05.09.2012	10:32	05.09.2012	12:18
PS80/HELI-39	AEM	122,7363	85,0574	ID: maisie_20120908_01	08.09.2012	08:51	08.09.2012	10:04
PS80/HELI-40	AEM	122,7074	85,0582	ID: maisie_20120908_02	08.09.2012	11:31	08.09.2012	12:51
PS80/HELI-45	AEM	61,0194	87,9269	ID: maisie_20120919_01	19.09.2012	07:04	19.09.2012	08:47
PS80/HELI-46	AEM	61,1033	87,9270	ID: maisie_20120919_02	19.09.2012	09:19	19.09.2012	10:50
PS80/HELI-47	AEM	58,3617	88,3718	ID: maisie_20120920_01	20.09.2012	06:48	20.09.2012	07:06
PS80/HELI-53	AEM	59,4066	88,9281	ID: maisie_20120922_01	22.09.2012	12:03	22.09.2012	13:11
PS80/HELI-54	AEM	56,1138	88,7793	ID: maisie_20120923_01	23.09.2012	07:07	23.09.2012	09:01
PS80/HELI-60	AEM	52,3243	86,4117	ID: orphan_20120926_01	26.09.2012	08:04	26.09.2012	09:12
PS80/HELI-61	AEM	52,2510	86,3176	ID: orphan_20120926_02	26.09.2012	11:35	26.09.2012	12:50
PS80/HELI-63	AEM	52,0525	84,8026	ID: orphan_20120927_01	27.09.2012	07:31	27.09.2012	08:55
PS80/HELI-65	AEM	52,1658	84,8016	ID: orphan_20120927_02	27.09.2012	09:47	27.09.2012	11:39

Data management

The sea ice thickness data will be released following final processing after the cruise in the PANGAEA database and international databases like the Sea Ice Thickness Climate Data Record (Sea Ice CDR).

The large dataset of the aerial images will be archived at the AWI long-term data storage system. The decision to publish the raw images or processed results (e.g. melt-pond fraction) will be made after the cruise.

3.2 Physical parameters of sea ice

Objectives

The changes of the predominant sea ice type in the central Arctic from multi-year to first-year sea ice in the recent years has an impact on the main physical properties such as thickness, texture and drift speed. To monitor and assess these changes, the main physical parameters on ice floe scale were investigated during ice stations and by the deployments of drifting buoys.

Work at sea

At each of the 9 ice stations four ice cores were extracted from the main coring site for processing and analysis of the following parameters: sediments (not sampled at PS80/224, PS80/237 and PS80/255), salinity, density and texture. At each core site an additional core was extracted to store in the archives. The main coring site consisted of a grid that was approximately 2 m x 2 m in dimension.

Ice thickness surveys were conducted at most ice station using an EM-31 towed inside a canoe. Several transects were conducted across the floe in order to provide a representative ice thickness characterization of the ice floe.

Drifting buoys were deployed during ice stations or during helicopter landings several kilometers off the cruise track of *Polarstern*. Three types of buoys were deployed: 1) Surface Velocity Profilers (SVP) which report position, air temperature and pressure. 2) Ice mass balance buoys (IMB) from the Scottish Association of Marine Research (SAMS) which report position and temperature values from a thermistor chain in the ice and ocean. 3) Seasonal ice mass balance buoy (SIMB) of the Cold Regions Research and Engineering Lab (CRREL) which report position, air temperature and pressure as well as ice and snow thickness.

Preliminary results

In total there were 10 sediment, 10 salinity, 10 density, 10 archive and 11 texture cores extracted at 9 ice stations (2 coring sites were conducted at ice station PS80/335). See Table A1 for a complete list of ice cores. Salinity, density and texture cores were processed onboard. The sediment cores and two of the texture cores will be processed in the lab at AWI.

Ice thickness at the coring site ranged between 0.75 m and 2.08 m. Additional cores were extracted along the ROV transects, in collaboration with sea ice biology, for analysis of the sea ice optical properties. In total there were 56 optical cores extracted with ice thickness ranging between 0.17 m and 2.82 m.

Sea ice thickness data from electromagnetic induction data exists from the ice stations 1 to 7. On the two last ice station the instrument was broken. The modal thickness ranged between 0.8 cm to 1.1 m for first-year sea ice station and 1.6 m or more for ice stations on multi-year ice. A list of all EM31 transects is given in Table 3.2.

The buoy deployments are summarized in Table 3.3. In total of 8 SVP's, 2 SAMS IMB's and 1 SIMB were deployed during the cruise.

Tab. 3.2: List of electromagnetic induction (EMI) sea ice thickness profiles during ice stations

Station	Name	Gear	Local-x	Local-y	Comment	Start Date	Start Time	End Date	End Time
PS80/224	ICE-1	EMI	110.0	91.4	EM31 sea ice thickness	14.08.2012	14:55:40	14.08.2012	15:43:44
PS80/237	ICE-2	EMI	-63.9	29.9	EM31 sea ice thickness	20.08.2012	10:18:07	21.08.2012	09:29:04
PS80/255	ICE-3	EMI	-82.7	34.3	EM31 sea ice thickness	25.08.2012	11:12:28	25.08.2012	12:21:36
PS80/277	ICE-4	EMI	-76.3	33.9	EM31 sea ice thickness	05.09.2012	04:30:04	05.09.2012	05:25:02
PS80/332	ICE-5	EMI	-83.1	31.8	EM31 sea ice thickness	07.09.2012	10:45:52	09.09.2012	13:33:08
PS80/335	ICE-6	EMI	-75.0	32.9	EM31 sea ice thickness	18.09.2012	10:54:13	18.09.2012	12:00:30

Tab. 3.3: List of deployment of drifting buoys during IceArc

Buoy Type	IMEI	Date	Time (UTC)	Longitude	Latitude
SVP	300234011541100	20.08.2012	05:00	31,11400	84,0510
SVP	300234011545080	24.08.2012	07:20	121,00638	80,9300
SVP	300324011540110	04.09.2012	08:15	130,04138	81,7411
SVP	300234011549100	09.09.2012	08:15	123,86028	85,1666
SVP	300234011540100	09.09.2012	08:45	123,77528	85,5450
SVP	300234011545100	18.09.2012	09:37	61,12400	87,9250
SVP	300234011544090	21.09.2012	09:46	57,60300	89,3498
SVP	300234011549080	23.09.2012	14:12	59,34770	89,1085
SAMS IMB	-	05.09.2012	14:00	130,86558	81,8796
SAMS IMB	-	22.09.2012	15:15	57,53883	88,8129
SIMB	-	25.08.2012	11:50	130,06632	82,8805

Data management

All ice core data and ice thickness data from the electromagnetic induction device have been published in the PANGAEA database after final processing. The ice cores will be stored in the cold storage facilities of AWI.

The positions and meteorological data of the surface velocity profiler (SVP) buoys are automatically uploaded to the database of the International Arctic Buoy Program (IABP), which is publically accessible.

3.3 ROV work and optical properties of sea ice

Objectives

The interaction of sunlight and sea ice is of critical importance for the energy- and mass-balance of the ice-covered Arctic Ocean. The energy penetrating into and through sea ice is the major energy source. Therefore, it is crucial for the eco-systems and geochemical processes in and beneath the sea ice. The main objective of the optical work during this cruise was to quantify the horizontal and vertical distribution of short-wave radiation in sea ice and the uppermost ocean. This work continues studies from the expedition ARK-XXVI/3 (TransArc, 2011) with additions of surface albedo measurements for satellite data validation.

Work at sea

The optical measurements during IceArc consisted of

1. Under-ice irradiance and radiance measurements along horizontal and vertical transects. These measurements were performed with two Ramses spectral radiometers (320-950 nm, Trios GmbH, Rastede, Germany)

operated on a remotely operated vehicle (ROV). These measurements were performed during 8 stations (Figure 3.1) complemented by manual under-ice measurements using a foldable arm (L-arm).

2. Surface measurements of solar irradiance with Ramses spectral radiometers above the sea ice during ice stations and along the entire route at the crow's nest of *Polarstern*.

3. Surface albedo (incident and reflected irradiance) measurements using a Fieldspec (Analytic Spectral Devices, Boulder, USA) along transects and on selected surfaces during the ice stations.

4. A stationary radiation station that was deployed during the first ice station and retrieved at the end of the cruise.

In addition, optical measurements, similar to those on the ROV, were performed on the SUIT (see Chapter 6.4). Furthermore, a total of 56 ice cores were retrieved from along the ROV transects, long-term station, and L-arm sites. These cores will be analyzed in cooperation with the sea-ice biology (see Chapter 6). An overview over all optical measurements is given in Table A1. More details on the methodology of the ROV, L-arm, and station measurements may be found in Nicolaus and Katlein (2012a) and Hendricks et al. (2012).

Preliminary (expected) results

All optical measurements will be combined in order to derive characteristic optical properties for different sea-ice conditions. In particular, differences between ponded and white ice as well as between different melt stages and degrees of snow coverage will be analyzed. The results and analyses will complement the data sets collected by Nicolaus and Katlein (2012a and 2012b).

Data management

All optical data will be published, including all meta data and related sea-ice properties, shortly after the cruise in Pangaea. Type and style of the data set will be identical to similar data from the expedition ARK-XXVI/3 (TransArc, 2011, Nicolaus and Katlein, 2012b).

3.4 Routine sea ice observations

Objectives

Methods to retrieve basic physical parameters by remote sensing of the sea ice cover, such as thickness, melt pond coverage, surface roughness and snow depth, are still under development. The longest ranging datasets of these parameters originate from visual observations during ship cruises, however standards for ice observations vary between different research vessels. As a recommendation by the Climate in the Cryosphere (CliC) Committee, a standardized ice observation protocol for Arctic sea ice was established for the use all ice-going ships. One main error source is the bias of parameters due to the limitation of human perception. Therefore automatic systems are currently under development, like side-looking cameras, which are designed to continuously retrieve sea ice parameters.

Work at sea

Hourly sea ice observations were carried out by trained observers on an hourly basis from the bridge of *Polarstern* according to the ASSIST protocol (Arctic Shipborne Sea Ice Standardization Tool). The observations were made during normal working hours between 7 am and 9 pm.

In addition, a 3D camera system was developed and deployed for this cruise. It consists of three cameras which continuously capture image of the ice. The intention of the system is to create metric 3D reconstructions of ice which will allow for automated measurement of parameters like floe size and freeboard. Two of the cameras function in a calibrated stereo pair and one captures images for structure from motion reconstruction.

Preliminary (expected) results

During the cruises more than 220 visual observations were made. Each entry consists of ice concentration, ice types and thickness and surface properties for each ice type. In addition time, position and basic meteorological parameters were noted and the ice conditions were additionally documented with three photos to the portside, bow and starboard side.

The 3D camera system captured images throughout most of cruise, and a total of 8 series of calibration images were taken on the ice. The images captured cover a wide range of ice conditions and types, from freshly forming sheet ice to thick multiyear ice. These images will be cross referenced with the ice observations made over the course of the cruise to train classification systems for automated ice observation and habitat identification.

Data management

The ice observations have been archived http://doi.pangaea.de/10.1594/PANGAEA.803221 and are distributed by the International Arctic Research Center (IARC) of the University of Alaska, Fairbanks.

The images captured by the 3D camera system will be put in a database and shared with collaborating institutes. The data will be used to further refine the image processing techniques used and to create a record of ice conditions.

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4. PHYSICAL OCEANOGRAPHY

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Objectives

During the past decade, the circulation and water masses of the Arctic Ocean have experienced considerable changes. The waters advected from the Atlantic and the Pacific became much warmer, the Atlantic inflow became saltier. On the other hand, the upper Arctic waters have freshened since the 1990s. Further observations are required to understand the impact of these changes and the underlying processes. The aim of the oceanographic part of this cruise was to document and quantify the present state of the water mass distribution and circulation in the Eurasian Basin and the outer Laptev Sea shelf. In the context of appropriate modelling, the observations will be fundamental to distinguish between variability and long-term trends in the Arctic.

Waters imported to the Arctic Ocean are subject to cooling, freezing and melting, altering the properties of these water masses. Of particular importance are the two branches of warm Atlantic Water, flowing into the Arctic Ocean through the Fram Strait and the Barents Sea. During their transit, these water masses are subject to transformation by surface processes and lateral mixing. Previous observations indicate that the flows of both Atlantic and Pacific waters are variable in time.

In the central Arctic, stratification due to fresh waters in the mixed layer and the halocline inhibits the release of heat from underlying waters to the atmosphere.

This stratification is maintained by continental runoff and ice or meltwater. However, the variable distribution of fresh water may facilitate the release of some of this heat in certain areas; for example, the recent convergence of fresh water in the central Arctic may, for dynamical reasons, lead to a weakening of the stratification along the warm boundary current at the rim of the basins. Changes may also occur from the different wind mixing with and without ice cover and the fact that now large areas have longer seasons without sea ice.

There are also indications of a (recent) change of the pathways of the Atlantic Water. The warmer branch from the Fram Strait seems to return already in the Nansen Basin back to the Atlantic sector; furthermore, the flow of Barents Sea water into the Canadian Basin may be reduced in the context of a strengthening Beaufort Gyre. Such changes will affect the properties of the water returning to the North Atlantic and hence directly or indirectly influence the Atlantic meridional overturning circulation.

To address these questions hydrographic sections were recaptured that had been taken in the Eurasian Basin during the cruises with *Polarstern*, *Oden* and expeditions within the NABOS project since the early 1990s; in addition, samples for analyses of oxygen isotope composition and soluble radionuclide ^{129}I were taken. To extend the observational range of the ship survey in space and time, we deployed autonomous, ice-based buoys and recovered bottom-moored observatories, deployed in previous years.

Work at sea

CTD casts and ship-borne ADCP measurements

Profiles of temperature and salinity were obtained using three Conductivity Temperature Depth (CTD) systems. Two of these systems, an XCTD-system (eXpendable CTD) and a recently developed light full-depth CTD-system, allowed profiles to be taken from ice floes within the range of the helicopter. This extended the observational range up to 70 nm from the ship track. In total, 172 CTD profiles were taken.

86 profiles (Fig. A1) were taken with a standard CTD/rosette water sampler system from Sea-Bird Electronics Inc. The SBE9+ CTD (S/N 937) was equipped with duplicate temperature (S/N 1373 and 1338) and conductivity (S/N 1198 and 1199) sensors, a Digiquartz 410K-134 pressure sensor (S/N 113135) and was connected to a SBE32 Carousel Water Sampler (S/N 718) with 24 12-liter bottles. Additionally, a Benthos Altimeter (S/N 1229), a Wetlabs C-Star Transmissometer (S/N 1220), a Wetlabs FLRTD Fluorometer (S/N 1853) and an SBE 43 dissolved oxygen sensor (S/N 734) were mounted on the carousel. The SBE 43 contains a membrane polarographic oxygen detector. The algorithm to compute oxygen concentration requires additional measurements of temperature, salinity and pressure, which are provided by the CTD system. To monitor the rotation of the rosette, a SUMO rotation sensor (S/N SUMO-01) was mounted on the rosette. From station , a bottom detector with a 5 m rope and 2 kg weight was mounted on the rosette to allow close approach of the bottom even in case of altimeter signal failure.

To calibrate the oxygen profiles 78 water samples from CTD rosette bottles were measured on-board with Winkler titration by the Benthic Biology and Biogeochemistry group. 66 salinity samples for the calibration of the conductivity sensors were taken from rosette bottles and analysed with a recently developed salinometer manufactured by Optimare Sensorsysteme AG (Bremerhaven, Germany) with Standard Water Batch p154. Further samples were taken to test bottle closure procedures (waiting time) and to accurately determine the density of deep Arctic water.

An XCTD-1, by Tsurumi-Seiki Co. Ltd. (Yokohama, Japan) was used to obtain 86 CTD profiles up to 1,100 m water depth, some while underway from the ship (Fig. A2) and some from ice floes reachable by helicopter. The system consisted of a launcher for expendable CTD probes and a mobile deck-unit for data acquisition. The probe sinks down with constant velocity measuring temperature and conductivity.

A third DTD system utilized a new light-weight, mobile winch with a thin rope. This winch has been developed by Gereon Budéus at AWI together with Optimare Marine Messsysteme and was tested during this cruise for the second time.

Underway measurements with a vessel-mounted narrow-band 150 kHz ADCP from TRD instruments and with two Sea-Bird SBE45 thermosalinographs were obtained to supply water current velocity and temperature / salinity data, respectively. The thermosalinographs are installed at 6 m depth in the bow thruster tunnel and at 11 m depth in the keel. The bow system was generally switched off while the ship was crossing sea ice, and occasionally the keel system was also switched off in heavy ice. The salinity of both instruments was regularly calibrated by analysing water samples with the salinometer. The ADCP worked well throughout most of the cruise with very few data gaps.

Oxygen isotopes ($\delta^{18}O$) and Iodine radionuclide (^{129}I)

Different water masses (e.g.: river water, Atlantic Water) have different oxygen isotopes ratios ($\delta^{18}O$) that can be used to separate the different water sources in the Arctic. The same is true for the Arctic sea-ice. For this reason, water samples from the CTD/rosette water sampler casts and from melted water from ice-cores were taken for $\delta^{18}O$ determination. 900 samples at 36 oceanographic stations and 8 sea-ice stations were collected.

Anthropogenic radionuclides released into European coastal waters flow northward through the Nordic Seas and label Atlantic Water (AW) entering the Arctic Ocean. By measuring the concentrations of the soluble radionuclide ^{129}I in the water column is possible to track the flow of the Atlantic Water in the Arctic and possible changes in the upper waters circulation. A total of 49 samples in 19 stations for ^{129}I concentration determination have been taken.

Bottom moored arrays

6 moorings were recovered during the expedition (Fig. A3).

To obtain the first timeseries of velocity, temperature, salinity, ice thickness and sinking particles in the Eurasian Basin return flow of Atlantic Water, five moorings had been deployed at two locations near the Gakkel Ridge during ARK-XXVI/3 (TransArc) in 2011. One set of moorings was located in the Amundsen Basin and another in the Nansen Basin. All were recovered during the cruise in 2012. The moorings are described in the cruise report from the 2011 expedition (Schauer et al., 2012, http://hdl.handle.net/10013/epic.39934) and will only be outlined briefly here.

Two mooring pairs with identical design and one extra mooring were deployed on either side of the Gakkel Ridge, near 82°N to 83°N (stations 252, 253 and 272 to 274, Fig. A4): One mooring of each pair carries a profiling CTD system, designed by Gereon Budéus at AWI, to give nearly full-depth profiles of temperature and salinity once a day. Unfortunately, both systems only recorded few profiles. At N1-1, only fifteen of the around 400 lead balls had been released by the top dispensing system, so that the profiler did not work for most of the year. At A1-1, around 200 lead balls had been dispensed, but only about 15 recovered in the bottom basket. As the profiler was at the bottom of the mooring during recovery, we suspect problems with the buoyancy package. The systems will undergo a technical check once back at AWI.

The other type of mooring had several current meters, CTDs and sediment traps at fixed depths. The ADCP appear to have recorded throughout. Only on the Amundsen Basin side of the Gakkel Ridge, an additional profiler for temperature/

salinity was deployed to measure the upper 200 m. Upon recovery, the winch cable was fully unreeled but attached to both the winch and the profiler. Several of the battery packs of the winch were flooded. The actual amount of profiles taken will be determined once the profiler data is recovered back at AWI.

Four moorings were scheduled for recovery on the outer Laptev Sea shelf, deployed in 2010 or 2011 as part of the Russian-German "Laptev Sea System" program. The moorings were designed to record the seasonal variability of water mass characteristics and currents throughout the water column, in order to improve the understanding of physical processes and ocean circulation near the Laptev Sea shelf break.

Despite successfully locating all four moorings via acoustic communication with the moorings' releasers, only mooring OSL2F on the central outer shelf could be recovered. Upon arrival at this location, communication with the release suggested an upright position of the mooring, which was confirmed by the ship's echosounder. However, the mooring failed to surface following the "release" command. Only the experience and skill of the *Polarstern* crew allowed the recovery of the OSL2F (station 304, Fig.A3) using a tugging method, whereby the mooring is encircled with a line between the ship and a dinghy and subsequently pulled toward the ship. For the other moorings, believable messages from the releases reported that the mooring was horizontal, and these systems could also not be found with the echosounder. In general, the following procedure was followed: searching for the mooring (acoustic releases) using the acoustic deck unit and transponder on about 30 m cable; in one case, this was done from the helicopter, in case the location had to be triangulated. After acoustic contact had been made, the release command was sent. As no mooring surfaced after release, the tugging manoeuvre was used once or twice to connect the ship with the mooring line.

For KOTELNYY10 and OSL4, the mooring was finally dredged with a steel cable an about 300 m long and several large hooks near the end. We suspect that the moorings KOTELNYY10, OSL2D and OSL4 were lying on the seafloor, due to the topmost buoyancy being lost or damaged. This could be by damage from a passing iceberg or material failure of the shackles connecting the mooring line.

Ice-tethered buoys

In order to obtain year-round measurements of ocean temperature, salinity, velocity, oxygen, bio-optical parameters and CO_2 as well as air temperature, pressure and wind velocity, ice-tethered platforms with various instruments were deployed. They consist of a sub-ice sensor system that is connected by a cable to a surface unit that has additional sensors and also transmits all data to shore via satellite. Since they drift with the host ice floe, they have the potential to provide observations over a substantial region of the Arctic Ocean. Four different types of ocean buoys were deployed, all of which record their geographic position at time of measurement:

3 ITPs (Ice-Tethered Profiler) equipped with Seabird CTDs that will sample temperature, salinity and dissolved oxygen profiles once per day between the surface and 760 m water depth,

1 Bio-ITP, equipped as the other ITPs, but with a bio-optical package, measuring Photosynthetically Active Radiation (PAR) and Chlorophyll Fluorescence; a combination of a CO_2 sensor package (SAMI), a CTD (Seabird SM-37) and a

dissolved oxygen sensor (Aandera optode) provided point measurements in the mixed-layer under the ice;

1 POPS (Polar Ocean Profiling System) equipped with Seabird CTDs that will sample temperature and salinity profiles once per day between the surface and 800 m water depth, and meteorological sensors for surface air temperature and barometric pressure,

2 UPTemPO, measuring barometric pressure at the surface and water temperature on a thermistor string to 80 m below the surface; one of these systems was designed for open water, featuring a subsurface drogue, and one for deployment in the ice.

Further autonomous buoys are described in the Sea Ice Physics section.

In total, 6 ocean buoy systems were deployed on 4 ice floes (3xITP and 1xPOPS, Fig. A4). One further ITP system was deployed but had to be subsequently recovered due to hardware problems.

The ITP / Bio-ITP systems manufactured by Woods Hole Oceanographic Institution (WHOI) in Woods Hole (Massachusetts, USA) measure twice daily temperature/salinity/depth/oxygen profiles with 1 Hz (nominally 0.25 m) vertical resolution between 8 and 760 m using a profiling CTD unit (Seabird Electronics, Inc. model 41CP) on a wire tether and an inductive modem to communicate the data to a surface unit (SU). The ITP SU records GPS position and relays all data via an Iridium satellite modem connection to a server at WHOI. The ITPs are manufactured by WHOI with a profiler from McLane Research Laboratories (Falmouth, Massachusetts, USA). The Bio-ITP measures, in addition, photosynthetically active radiation and chlorophyl fluorescence throughout the profiles and CO_2, dissolved oxygen and temperature / salinity pressure just under the ice. Two ITP were provided by AWI and the remaining ITP by WHOI, including the Bio-ITP.

One system similar to the ITP, Polar Ocean Profiling Systems (POPS) manufactured by MetOcean Data Systems (Dartmouth, Nova Scotia, Canada) was also deployed. The POPS were configured to measure temperature/salinity/depth profiles at the same vertical resolution as the ITP systems. and surface atmospheric temperature and barometric pressure. The data sampling intervals for meteorological and ocean profiling data were set to be 3 hours and 1 day, respectively.

All ocean buoys were distributed on four sites, one of them close to the North Pole (POPS, station PS80/360), but most in the Eurasian Basin north of the Laptev Sea (ITP, stations PS80/255 and PS80/323; Bio-ITP, station PS80/335) in order to maximise their expected drifting time and range. All ocean buoys were deployed while the ship was docked to the respective ice floe. For all buoys, we found ice floes with substantial ridges and deployed the systems in ice more than 1 m thick. So far, the deployed ITP and POPS systems have produced reasonable vertical profiles of temperature and salinity. For a detailed site map of ITP and POPS locations on each ice floe, please refer to Section 3.

Preliminary (expected) results

The results of all CTD casts are still preliminary, as the final calibration is being done after the cruise. The ADCP data will be processed after the cruise for further analysis in conjunction with the CTD data.

A first look at the CTD profiles indicates a freshening in the Eurasian Basin, relative to observations from 2011.

The warm Atlantic Water core around 30°E became about 0.3 °C warmer and 0.02 saltier than in 2007. The return flow of the subsurface warm Atlantic Water, entering through the Fram Strait, can be traced along the Eurasian continental slope to the Laptev Sea and along the Gakkel Ridge.

Concerning the deep water masses, the section at 30°E has revealed that the warming and saltening of the deep waters at the entrance of the Arctic in the last 5 years equals that observed in the previous 13 years. The sections above the Gakkel Ridge have provided evidence of hydrothermal activity in different locations above this ridge.

Integration to national and international programmes

The oceanographic work of the cruise was supported by the current HGF (Helmholtz-Gemeinschaft Deutscher Forschungszentren) Programme and by the project "The North Atlantic as Part of the Earth System: From System Comprehension to Analysis of Regional Impacts" funded by the German Federal Ministry for Education and Research (BMBF). The ice-based platforms were funded through the Hybrid Arctic/Antarctic Float Observation System (HAFOS) and by the Woods Hole Oceanographic institution (WHOI) and they contribute to the "International Arctic Buoy Programme" (http://iabp.apl.washington.edu/). Instrumental work was also supported by the Japan Agency for Marine Earth Science and Technology (JAMSTEC).

Data management

Processed and finally calibrated data from the ship rosette CTD, underway CTD, the ADCP and the moorings from the Gakkel Ridge are available through the PANGAEA database (World Ocean Data Center #4; doi:10.1594/PANGAEA.802904). The POPS data will be processed in-house at AWI, but will be made available in public databases, either ARGO or PANGAEA, in the future. The ITP data can be downloaded from the WHOI ITP web site.

5. GEOCHEMISTRY (GEOTRACES)

5.1 Methane cycling in sea-ice

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Objectives

Air - sea-ice - ocean interactions in the polar regions have a substantial impact on the oceanographic regime, natural biogeochemical cycles and global climate. However, our understanding of the fundamentals of the associated surface chemical, physical, and biological exchange processes that occur at relevant interfaces, particularly those associated with sea-ice, is very limited indeed. Changes in brine salinity and salt precipitation/dissolution cycles affect the solubility of gases (minor direct relationships for most gases, but quite dramatic, indirect relationships for carbon and sulphur dioxides) and organic solutes. These relationships dictate the physical controls on mass, gas and energy fluxes operating within the ocean-sea-ice-atmosphere system and hence play an important role in chemical exchange across the sea-ice interface.

We investigate the physical, chemical, and biologically-mediated mechanisms and exchange processes involving pathways of the climatically relevant trace gas methane in sea-ice. The aim of our proposed work was to obtain a detailed characterization of the physical, biological and chemical environment of sea-ice, with an emphasis on sites supporting growing biological assemblages.

Work at sea

Ice cores have been collected from one-year and multi-year ice, respectively. We sampled ice cores at nine ice stations. In order to analyze the variability within one floe we occasionally sampled at two different sites per floe. Two additional multi-year ice sites have been sampled via helicopter flights. One archive ice core per coring site is transported frozen to the home laboratory. Two cores per coring site have been melted immediately on board to collect the gas phase. On each site a sackhole has been sampled to collect brine. The depth of the sackhole was accustomed to ice thickness at each coring site.

After sampling, methane was immediately measured on board ship, using a gas chromatograph equipped with a flame ionization detector (FID). Furthermore, gas samples have been collected and stored for analyses of the $\delta^{13}C$ CH_4 values in the home laboratory. To obtain methane oxidation rates, sackhole samples and the melted cores have been spiked with $^{3}HCH_4$ and $^{14}CH_4$, respectively, and incubated for 72 hours. Additionally, bacterial cells were collected from the melted ice by filtration on 0.2 µm filters and occasionally fractionated on 5.0 µm and 0.2 µm filters, for later determination of the prokaryotic communities and methane conversion pathways.

During the CTD transect in the Laptev Sea the water column was sampled at up to ten different depth for determination of methane concentration.

Preliminary results

First results from methane concentration measurements in sea-ice showed values in the range of air concentration. Variability between different ice types could not be observed. Samples for stable isotope analyses and oxidation rates will be processed and analyzed in detail after the cruise.

Data management

Please refer to the end of this chapter on page 36.

5.2 Natural radionuclides

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Objectives

The main objective is to evaluate the effect of varying conditions of sea-ice coverage on the rates of carbon export from the upper water column and remineralization, as well as its final fate in the bottom sediments. We used a suite of natural radionuclides (^{7}Be, ^{210}Pb, ^{210}Po and ^{234}Th) as tracers, with different half-lives and biogeochemical characteristics, in order to evaluate the magnitude of the exchange rates between sea ice, atmosphere and surface waters of those isotopes. Since ^{7}Be can be progressively incorporated directly into sea ice via atmospheric deposition, it is a useful tracer of the ability of the ice to incorporate atmospheric fluxes of other chemical species and/or contaminants. Particulate organic carbon (POC) export will be evaluated using the $^{234}Th/^{238}U$ and $^{210}Po/^{210}Pb$ disequilibria. The difference in half-lives of ^{234}Th and ^{210}Po allows the study of export production rates over different time scales (weeks and months, respectively). The sediment burial and bioturbation rates will be estimated by using ^{210}Pb and artificial radionuclides (^{137}Cs) as markers. We also collected water samples for ^{236}U, an anthropogenic radionuclide introduced in the environment by detonation of nuclear weapons in the atmosphere and by reprocessing of nuclear fuel. The goal is to obtain data in order to discern if it can be used as a transient tracer in the oceans.

Work at sea

Precipitation and aerosols

A collector of precipitation was installed on the Observation deck of *Polarstern* to collect atmospheric precipitation. A total of 7 samples were collected in order to analyze ^{7}Be, ^{210}Pb and ^{210}Po. The precipitation collected was acidified by adding HCl and spiked with stable Be, stable Pb and ^{209}Po. $FeCl_3$ was also added as a carrier. After equilibration, the pH was raised until iron precipitate was clearly observable. The precipitate was allowed to settle and the supernatant was removed by syphoning. The precipitate was stored and will be analyzed using gamma and alpha spectrometry techniques at the home laboratory. Filtration of aerosols using a high flux pump was carried out in parallel by the NIOZ trace metal group (section 5.3). A total of 8 filters have been obtained. A half of each filter will be processed to analyze ^{7}Be, ^{210}Pb and ^{210}Po concentrations.

Sea ice

A total of 9 ice stations were sampled to analyze the radionuclides of interest. The different compartments analyzed were: snow, surface ice, ice cores, under-ice water and melt ponds. Lead-210 and ^{210}Po were sampled from all these compartments, together with phosphorus. Beryllium-7 was measured in all compartments except in ice cores, while ^{234}Th was measured in all compartments except in snow. Samples of snow deposited onto the sea ice were collected at 5 ice stations (St. 323, 335, 349, 360 and 384). Surface sea-ice samples were collected at each ice station (except at St. 323 and 384) by coring several ice cores (~45) and sawing them to analyze the upper 20 cm. At the same stations, several replicates of sea-ice cores (between 7 and 20) were sampled and melted all together. After removing aliquots for ^{234}Th and phosphorus analyses, the remaining volume was filtered through a 0.2 μm filter to analyze the dissolved and particulate fractions. The thorium samples were processed according to the MnO_2 co-precipitation technique (Benitez-Nelson et al. 2001, Buesseler et al. 2001). The samples were filtered through QMA filters, dried and prepared for beta counting. The counting was done on board using low background beta counters (Risø National Laboratories). Lead-210, ^{210}Po and ^{7}Be samples were processed as described above for the precipitation samples. Phosphorus samples were stored at -20ºC and sent to the University of South Carolina (USA) for further analysis. Usually, one melt pond per station was sampled using an *in-situ* pump (well pump). Water under the ice was sampled using the same pump, integrating the upper 10 m for ^{7}Be, ^{210}Po and ^{210}Pb analyses. For ^{234}Th measurements, 3 discrete depths were sampled by the NIOZ trace metal group. In addition, a total of 4 sea-ice algae and 4 sea-ice sediments samples were collected from ice stations and also using the helicopter. ^{234}Th measurements were done on board and ^{7}Be, ^{210}Pb and ^{210}Po analyses will be done at the home laboratory.

Water column

In order to study the ^{234}Th/^{238}U and ^{210}Po/^{210}Pb disequilibria in the water column, one depth profile (12 depths: from 10 to 400 m) was collected at each ice station (except at St. 323 and 384, where the ^{210}Po and ^{210}Pb profile was not taken). Total ^{234}Th concentrations were analyzed in 4 L seawater samples following the MnO_2 co-precipitation method and measured by beta counter on board. Uranium-238 activity, due to its conservative behaviour in seawater, is typically derived from salinity (Owens et al. 2011). However, additional seawater samples were collected at St. 231, 324, 353 and 365 to confirm the U-salinity relationship. Lead-210 and ^{210}Po samples were collected in 10 L cubitainers. The samples were acidified with HCl and spiked with stable Pb and ^{209}Po. After the equilibration time, Co and APDC solutions were added, creating greenish floccules. The samples were filtered through a 0.2 μm membrane filters and stored for further processing. Large (>53 μm) particles for analyses of ^{234}Th, ^{210}Po, ^{210}Pb, phosphorus, POC and PON were collected using *in-situ* filtration pumps. Four pumps were deployed at 25, 50, 100 and 150 m at each ice station. Pumps filtered on average 1,500 L during 2 h. Particles were retained using a 53 μm mesh screen and removed from the screen by rinsing it with filtered seawater. Three ^{236}U profiles, of 8 depths each, were sampled at stations 227, 295 and 378. The samples were sent to the Laboratory of Ion Beam Physics (Zurich, Switzerland) to be measured using low energy accelerator mass spectrometry (AMS).

Bottom sediments

One sediment core was obtained with the multicorer at each ice station. The core was sliced every cm from 0 to 10 cm, further slices were collected at 15 - 16 cm and 20 - 21 cm. Each slice was dried and stored in plastic bags. Gamma and alpha spectrometry measurements are going to be conducted at the home laboratory in order to determine ^{210}Pb, ^{226}Ra and ^{137}Cs activities. Appropriate physic-mathematical models will be used to determine mixing and sedimentation rates for the last 100-150 years.

Preliminary results

The preliminary ^{234}Th export fluxes at 25 m derived from the deficits in the water column including four CTD seawater samples at 10, 15, 20 and 25 m (assuming steady state and with error estimates only including counting statistics) from all the ice stations are shown in Fig. 5.2.1. These results need to be corrected for final background counts and for chemical recoveries.

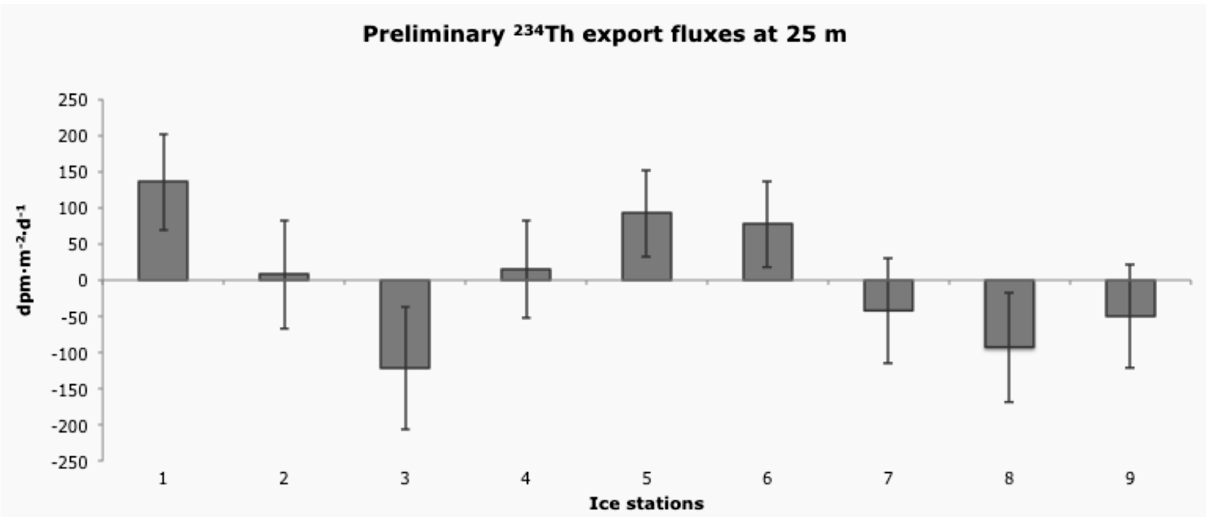

Fig. 5.2.1: Preliminary ^{234}Th export fluxes derived from the water column at 25 m (including four CTD seawater samples at 10, 15, 20 and 25 m) at all the sampled stations

In general, low or no significant preliminary ^{234}Th export fluxes have been obtained, in agreement with previous studies carried out in the Central Arctic Ocean (Cai et al. 2010). However, differences can be observed between stations. We will investigate the causes of those differences considering factors as primary productivity, ice coverage, water masses, etc., in order to better describe the particle fluxes in this region.

Data management

Please refer to the end of this chapter on page 36.

5.3 Nutrient and sea-ice trace metal biogeochemistry

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Objectives

A main objective is the investigation of nutrients relevant to primary production in and under the ice. In addition to the major nutrients phosphate, silicate and nitrate+nitrite (PO_4, Si, NO_3+NO_2), certain trace metals (TM) such as Iron (Fe), Mn, Zn, Cu, Mo, Cd are essential for the primary productivity and living organisms. Inversely, at high concentrations or present under particular chemical forms, some metals, like Cu and Zn, can become toxic to algal growth. Therefore, these nutrients and trace elements have a crucial impact on the biogeochemical cycles of carbon and other elements with ultimate influence on the Earth climate system. Little is known about these trace elements in sea-ice (SI). Recent works showed that Fe is 10-100 times more concentrated in sea-ice than in underlying seawater (Aguilar-Islas et al., 2008; Lannuzel et al., 2010), that sea-ice melt can deliver up to 70 % of the daily Fe supply to the surface waters and that Fe would largely derive from the under-ice water (UIW) rather than from atmospheric inputs (Lannuzel et al., 2008). This may hold true for the Arctic as well.

Work at sea

A total of 8 stations were sampled to investigate the concentrations of major nutrients, trace metals and their isotopes, DOC and pigments. For each station, samples of snow, scattering layer, SI, sack-hole water, UIW and melt-pond water were collected at first when on station in clean conditions to avoid contamination by using proper equipment (*e.g.* Titanium corer). The field work was done in collaboration with I. Peeken, simultaneously with the sampling for other chemical and biological parameters such as POC, pigments and flow cytometry (*cf.* 6. Biology of sea-ice) that will be used for further interpretations.

All samples for TM were processed onboard in a container equipped of class-100 laminary flow hoods. Sea-ice cores were sliced in sections of 10 to 30 cm and melted. All water samples (melted cores included) were filtered over 0.2 µm polycarbonate filters to separate the dissolved from the particulate fraction. Unfiltered samples were also taken. The concentrations of dissolved Fe (DFe) were measured onboard by Flow Injection Analyses, and all other samples were acidified or frozen for later analyses at the home laboratory: 1/concentrations of trace metals will be determined by isotopic dilution with a HR-ICPMS; 2/ organic complexation of Fe will be investigated by voltammetry; 3/ the fractionation of natural Fe and Zn isotopes will be measured by Nu Plasma MC-ICP-MS (de Jong et al., 2007).

Nutrients were analyzed in an air-conditioned lab container with a, Technicon TRAACS 800, continuous flow auto analyzer. About 2200 samples, including CTD, Multi Corer pore waters, Benthic Lander, and lab experiments were measured. Ice related and experiment samples were filtered over 0.2 µm prior analysis.

Measurements were made simultaneously on four channels: phosphate, silicate, nitrate and nitrite together, and nitrite separately. All measurements were calibrated with standards diluted in low nutrient seawater (LNSW) and was used as wash-water between the samples. For the Ice related samples having different salinities, all samples were diluted with LNSW or demineralised water (18.2 MΩ) to a salinity of approx 12. This allows the samples to be analysed all within the same calibration salinity. Some 400 samples ice related and from experiments will be taken home in a freezer -18C to be analyzed for NH_4^+.

Preliminary results

The concentrations of DFe ranged from 0.19 to 28.7 nM Fe in SI and from 0.04 to 3.5 nM Fe in the UIW (Fig. 5.3.1). At the first 3 stations (St. 224, 237 and 255) the lowest concentrations of DFe were measured in both SI and seawater (SW). At the 3 stations were sampled on a transect Northwards from the Laptev Sea (St. 277, 323 and 335) the concentrations of DFe were the highest in SW (~3 nM Fe), probably due to the influence of the continental shelf and river inputs. Here, DFe concentrations in SI decreased from 20 nM Fe at the top to 3 nM Fe at the bottom ice. At the Northernmost station (St. 360), the vertical distribution of DFe in SI differed from the other stations, with maximum concentrations in the middle sections (>25nM Fe), probably characteristic of multiyear ice compared to the other stations (first year ice). Sack-hole and meltpond samples had relatively high DFe concentrations (3 to 11 nM Fe) and may represent a stock of bio-available Fe for the living organisms in and under the ice when melting.

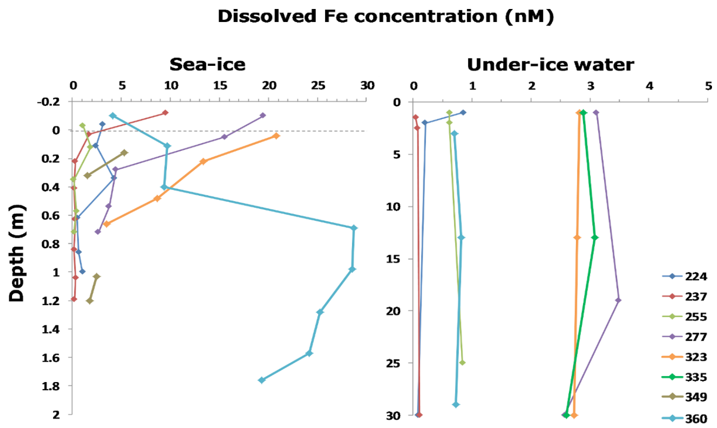

Fig. 5.3.1: Vertical distribution of dissolved Fe (nM) in SI and in UIW with depth (m). The depth of 0 m corresponds to the sea-level

The dissolved nutrients were measured at higher concentrations in SW compared to the SI: Si, NO_3+NO_2 and PO_4 concentrations in SI were <0.5, <1 µM and <0.15 µM, respectively. In SW, their concentrations range were 1-5 µM, 0-4 µM and 0.1-0.4 µM, respectively. Spatial variations in nutrient concentrations were also seen in SW, with the stations close to the Laptev sea enriched in Si but depleted in NO_3+NO_2, and the first 3 stations influenced by the Atlantic inflow enriched in NO_3+NO_2 and PO_4 but depleted in Si. These results will be confronted to other chemical, biological and physical parameters for further explanations.

Data management sections 5.1 to 5.3

Preliminary data will be available to the cruise participants on board and external users after request to E. Damm (section 5.1), P. Masqué and M. Rutgers van der Loeff (section 5.2), and V. Schoemann (section 5.3). After one year the finally processed data will be submitted to PANGAEA. Cores processed from section 5.1 are labeled as GEO1-4 in the appendix. All nutrients data are available among all cruise participants. K. Bakker (NIOZ) should become co-author on any articles that comprise nutrient data. If only very few nutrient data is used, and/or that the nutrient data is not really pivotal for the scientific interpretation, mentioning in Acknowledgments will be adequate.

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6. BIOLOGY OF SEA ICE

6.1 Sea-ice algae

Ilka Peeken[1,2], Mar Fernández Méndez[1,3],
Christiane Uhlig[1], Anique Stecher[1,4]

[1]AWI
[2]MARUM
[3]MPI
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Objectives

Global warming has caused a dramatic decrease in summer sea-ice extent in the Arctic during the past decade reaching the record minimum this year (2012). Additionally, the concentration of multi-year ice (MYI) has decreased substantially. Both changes have major implications for the sea ice biota by affecting their biomass, primary production and biodiversity. Due to the strong spatial heterogeneity of sea ice biota, current estimates of total biomass still need to be improved by using remotely operated vehicles equipped with biomass sensors.

The loss of sea ice might also be favourable for the phytoplankton primary production by increasing the growth season. However, nutrient availability is considered to be the limiting factor controlling the primary production of the Arctic ecosystem. Nutrient depletion and warming have further shown to favour especially small phytoplankton species with poor food quality for higher trophic levels. Additionally, the replacement of MYI by first-year ice (FYI) will further increase the occurrence of melt ponds, an ecosystem which might have been overlooked in previous investigations.

During this cruise the following questions were addressed:

- How will primary production in the Arctic change under reduced ice conditions?
- How will the change in sea ice conditions affect the coupling of pelagic and benthic ecosystems?
- Under which conditions and to what extent may organisms be able to adapt to changing sea ice conditions?
- How are changing sea ice conditions expected to affect biodiversity?

Work at sea

Biological sampling was performed during the 9 ice stations (Fig. 1.0, Tab. A1). At each ice station several ice cores were taken at the main coring site, from which different parameters were determined (Tab. 6.1.1). Occasionally brown ice/frozen melt pond ice was collected using different sampling methods (ICES, Tab. A1). Based on the ROV profiles, additional optical cores were taken along the ROV transect (in collaboration with the Sea Ice Physics group) and processed to gain variables explaining optical properties of the sea ice (Tab. 6.1.1, label OPT). These data will be used to support deriving a method to estimate biomass from the optical sensors, mounted to the ROV (Chapter 3.3) and the SUIT (Chapter 6.4). The majority of the cores were sectioned in 10 cm intervals and melted in filtered sea water or artificial brine. The OPT and BAT 1 cores were melted as a whole without additions. Under ice water (UIW) from three depths (0 m, chlorophyll maximum and 30 m) and sackhole samples were taken in collaboration with M. Le Guitton and C.E. Thuróczy (NIOZ). Melt pond sampling involved the sampling of water and algal aggregates, when present. A minimum of three melt ponds per station were sampled. For nucleic acid extractions algae communities from ice cores DNA and RNA (Tab. 6.1.1, Tab. A1) were collected on 1.2 - 2.0 µm filters. By applying a number of molecular and phylogenetic approaches the eukaryotic sea ice algae community and its transcriptional activity within the sea ice will be determined. All samples (Tab. 6.1.1) were preserved and stored at the temperature required for each parameter (e.g. liquid nitrogen and further storage in -80°C for RNA samples). For the aggregates and some ice cores, a preliminary microscopic examination was carried out on board. To determine the pico- and nanoplankton (PNP), flow cytometer measurements were carried out on fresh samples using an Accuri C6 flow cytometer. Three size groups were quantified: pico-plankton (0 - 3 µm), small nanoplankton (3 -10 µm) and large nanoplankton (10 - 25 µm).

Primary productivity was measured using the 14C uptake method incubating the samples under a range of light intensities (0 - 400 µE/m^{2}s) at a constant temperature of -1, 3°C. At each ice station a photosynthesis-irradiance curve was produced for the ice (divided in top and bottom), the water under the ice and one melt pond. Additionally nutrient enrichment experiments were performed with melted sea ice samples (PS80-335 and 360). In stations where algal aggregates were present, size-fractionated filtration of PP, dissolved organic production and carbon transfer to heterotrophs were determined. In parallel to these carbon transfer experiments, samples were taken for dissolved organic carbon (DOC), bacterial counts, NanoSIMS and CARD FISH analysis. To explore the diversity of nitrogen-fixing bacteria, representative samples of each habitat were filtered on Sterivexfiters and stored at -20°C for further genomic analysis.

Tab. 6.1.1: Parameters obtained at each ice station (for further details see Tab. A1).

			Parameters obtained at each ice station						
Gear	**Label**	**Sample**	**PIG**	**Frac_Pig**	**POC**	**PNP**	**TEP/CSP**	**PAB**	**CDOM**
HP	MP	Melt Pond Water	x		x	x	x	x	x
HP	MPA	Melt Pond Aggregates	x		x	x	x		
CORE	BIO	Ice core*	x	x	x	x	x	x	x
CORE	OPT	Ice core	x			x		x	x
PERI	UIW	Under ice water*	x	x	x	x	x	x	x
PERI	SH	Sack holes*	x	x	x	x			

			Parameters obtained at each ice station						
Gear	**Label**	**Sample**	**BPSi**	**UT**	**PP**	**DIC**	**Nfix**	**DNA**	**RNA**
HP	MP	Melt Pond Water	x	x	x	x	x	xx	x
HP	MPA	Melt Pond Aggregates	x	x	x	x	x	xx	
CORE	BIO	Ice core	x	x				xx	
CORE	DNA	Ice core						x	
CORE	RNA	Ice core							x
CORE	BAT1	Ice core			x	x	x		
CORE	OPT	Ice core		x					
PERI	UIW	Under ice water	x	x	x		x	xx	x

Abbreviation as following: BIO: Biology core label
BAT: Primary productivity core label
BPSi: Biogenic particulate Silica
CORE: Ice Corer
CDOM: Colored Dissolved Organic Matter
DIC: Dissolved Inorganic Carbon
DNA: Desoxyribonucleic Acid
DOC: Dissolved Organic Carbon
Frac_Pig: Fractionated pigments (<10 µm &> 10 µm)
HP: Hand Pump
MP: Melt Pond
MPA: Melt Pond Aggregates
Nfix: Nitrogen fixers Biodiversity
OPT: Optical core label
PABS: Particulate Absorption
PERI: Peristaltic Pump
PIG: Pigments
PNP: Pico-Nanoplankton
POC: Particulate Organic Carbon
PP: Primary Productivity
RNA: Ribonucleic Acid
TEP/CSP: Transparent Exopolymers/ Comassie Stainable Particles
UT: Utermöhl samples
SH: Sack Hole
UIW: Under Ice Water. XX indicate additional size fractionated DNA sampling (>10, 3 - 10 0.2-3 µm), * For BIO core; UIW and SH samples were processed in collaboration with M. Le Guitton.

Preliminary results

Preliminary results of the PNP indicate higher standing stocks of algae biomass in MYI compared to annual sea ice (see also Boetius et al. 2013). A general higher biomass is further corroborated by a higher phototrophic activity in MYI. These higher rates per volume are also present when comparing under-ice water with the sea ice. Again the cell count-based carbon estimates show the same variability. Sack holes also show sometimes higher algae concentration then the UIW. Highest concentrations of PNP however were found in the aggregates obtained from melt ponds. Significant differences in light adaptation could be observed between the different communities.

Data management

The data of sea ice and water sampling are provided in the PANGAEA data base (see http://doi.pangaea.de/10.1594/PANGAEA.803293).

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6.2 Sea-ice microbiology

Judith Piontek[1], Luisa Galgani[1,2]

[1]Geomar
[2]AWI

Objectives

Research during the last two decades revealed a functioning microbial loop in sea ice of the polar oceans. Bacterial activity has been demonstrated for Arctic sea ice of all seasons at temperatures down to -20°C. However, factors that control bacterial activity in sea ice are largely unknown. It has been suggested that beside temperature also brine salinity and pH as well as organic matter that is available for heterotrophic consumption may substantially contribute to the regulation of bacterial abundance and metabolism. For the central Arctic Ocean the number of data sets that combine bacterial abundance and activity with environmental parameters are still limited.

Work at sea

Samples for bacterial abundance and production were collected in sea ice, melt ponds and under-ice water (UIW). Furthermore, concentrations of combined carbohydrates and amino acids will be determined by IC and HPLC, respectively, to better characterize the substrate supply to the heterotrophic microbial communities (Tab. 6.2.1).

Tab. 6.2.1: Sampling of sea ice, melt ponds (MP) and under-ice water (UIW) for combined carbohydrates (CCHO), amino acids (AA), bacterial (bac) cell numbers and production.

Station	CCHO			AA			bac cell numbers			bac production		
	ice	MP	UIW	ice	MP	UIW	ice	MP	UIW	ice	MP	UIW
PS80/224	x	X	x	x	x	x	x	x	x	x	x	x
PS80/237	x	x	x	x	x	x	x	x	x	x	x	x
PS80/255	x	x	x	x	x	x	x	x	x	x	x	x
PS80/277	x	x	x	x	x	x	x	x	x	x	x	x
PS80/323	x	x	x	x	x	x	x	x	x	x	x	x
PS80/335	x		x	x		x	x		x	x		x
PS80/348	x	x	x	x	x	x	x	x	x	x	x	x
PS80/360	x		x	x		x	x	x	x	x	x	x
PS80/384			x			x		x	x		x	x

Preliminary results

First results revealed elevated bacterial production in the bottom section of sea ice and higher activities in MYI than in FYI. Melt ponds containing ice-algae aggregates showed substantially higher levels of bacterial production than shallow ones that did not contain aggregates and were not connected to the ocean.

Data management

Please refer to the end of this chapter on page 46.

6.3 Sea-ice microbiology

Karl Attard[1], Frank Wenzhöfer[2,3], Heidi Sørensen[1]
not on board: Daniel F. McGinnis[1], Ronnie N. Glud[1], Søren Rysgaard[4]

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[2]MPI
[3]AWI
[4]University of Manitoba

Objectives

Algal communities living in and at the bottom of sea ice are to a large extent maintained by the nutrients that they are able to access from the underlying water column. The vertical turbulence in the water layers immediately beneath the sea ice controls the supply of nutrients to the ice algae, so direct measurements of turbulence and nutrient fluxes at the ice-water interface provide valuable information about the environmental setting and biological activity of the under-ice ecosystems. We investigated the turbulent structure and physico-chemical gradients from the ice-water interface down to 100 metres depth using a suite of *in-situ* instrumentation, complemented by a variety of sea ice parameter measurements.

Work at sea

The metadata for the work carried out by the Sea-ice biogeochemistry group is summarized in the Appendix (Tab. A2). Aquatic eddy-covariance measurements for dissolved oxygen (DO) were successfully carried out at all stations (1 to 9). Temperature eddy covariance measurements were successfully carried out at stations 2 to 5. Damage to the temperature sensors resulted in no temperature eddy covariance measurements at stations 6 to 9. Salinity eddy covariance measurements were successfully carried out at stations 2 to 9. All data was recorded at 64 Hz and averaged down to 8 Hz for flux derivation. The data processing protocol was largely consistent with the steps outlined by Lorrai et al. (2010).

Microstructure (MSS) turbulence profiles were carried out at all the stations to a depth of 80 to 90 metres, with an average of 9 profiles per station.

Under-ice moored ADCP, CTD (+ PAR & DO), and RCM measurements were carried out at all stations. The deployment duration typically covered at least 70 % of the time spent at each ice station.

Complementary sea ice profiles of Bulk Oxygen, bulk dissolved inorganic carbon (DIC) and Total Alkalinity (TA), were carried out at all stations (1 - 9).

To understand the nitrogen cycle e.g. supplement of nitrate by possible nitrogen fixation or the occurrence of denitrifiers and anaerobic ammonium oxidizers under suboxic conditons in parts of the ice core during this cruise nitrogen fixation was measured in melt ponds at Stations 1, 2, 4 and 7. A complete analysis of denitrification and anammox, nitrification and nitrogen fixation in the sea ice (sections: top, middle, and bottom) was performed at station 1. Melt pond aggregates from station 7 were used to determine denitrification and anammox, nitrification and nitrogen fixation and oxygen consumption/production.

Preliminary (expected) results

Some results from the eddy covariance DO measurements are shown in Fig. 6.3.1. The rates suggest a net O_2 uptake by the under-ice environment of 2 - 10 mmol m^{-2}. Further data processing of the temperature eddy covariance data is required to accurately determine the biological contribution to the DO exchange rate. The aquatic eddy correlation, MSS profiler, ADCP and RCM data as well as the sea ice parameter samples collected by the sea ice biogeochemistry group requires further processing.

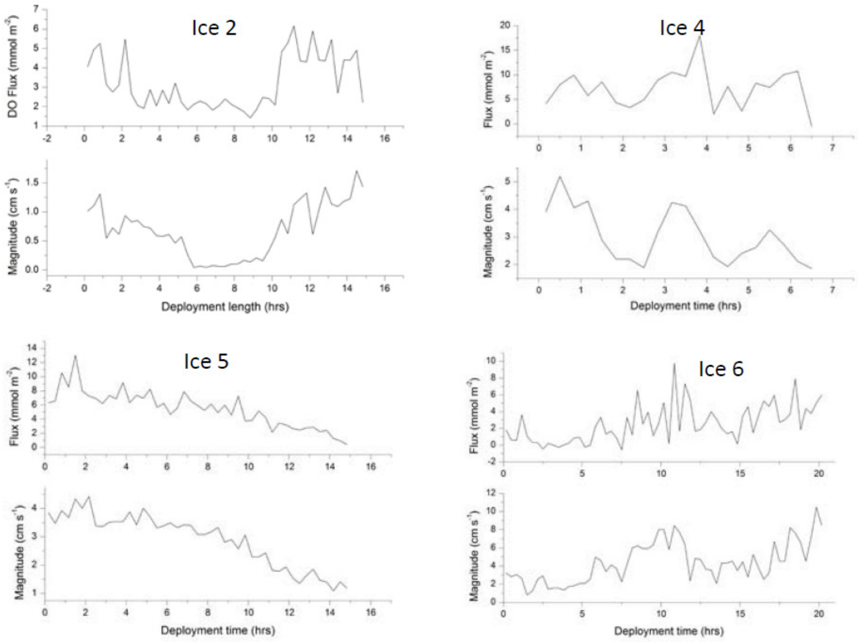

Fig. 6.3.1: Sample data for DO fluxes and current velocity as measured by aquatic eddy covariance at ice stations 2 (top left), 4 (top right), 5 (bottom left) and 6 (bottom right)

Figure 6.3.2 shows an example dataset from the MSS profiler measurements, collected over several hours at ice station 8. Shown are time series plots for temperature, density, epsilon, and eddy diffusivity (Kp).

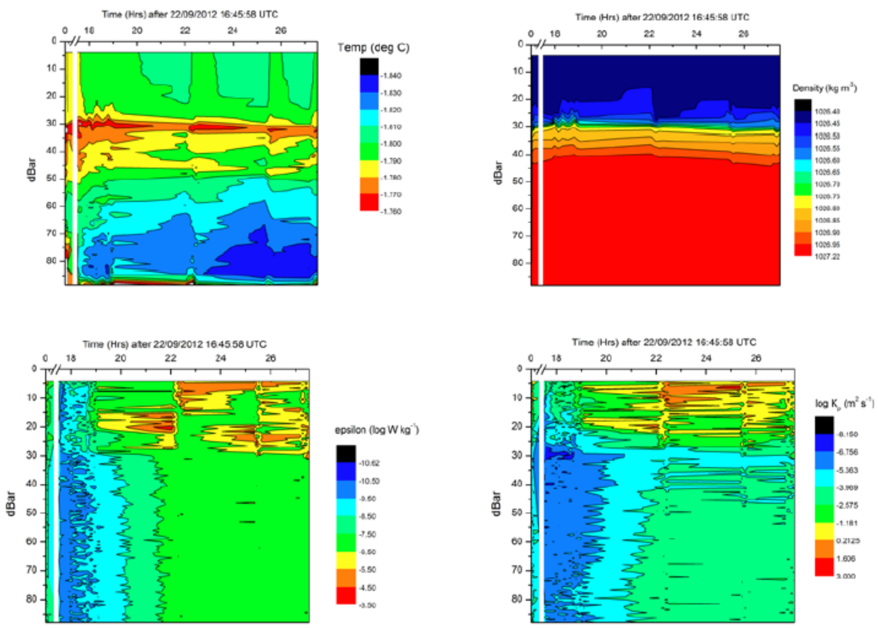

Fig. 6.3.2: A timeseries of MSS under-ice profiles for temperature (top left), density (top right), epsilon (bottom left) and eddy diffusivity (bottom right) at ice station 8

References

Lorrai, C., McGinnis, D.F., Berg, P., Brand, A., Wüest, A. (2010) Application of Oxygen Eddy Correlation in Aquatic Systems. Journal of Atmospheric and Oceanic Technology, 27, 1533-154

Data management

Please refer to the end of this chapter on page 46.

6.4 Under-ice zooplankton

Hauke Flores[1], Carmen David[1], Benjamin Lange[1], Michiel van Dorssen[2]

[1]AWI
[2]Van Dorssen Metaalbewerking

Objectives

Arctic sea ice ecosystems thrive significantly on carbon produced by ice-associated microalgae. Species feeding in the ice-water interface layer probably play a key role in transferring carbon from sea ice into pelagic food webs. The significance of this trophic carbon flux, however, is poorly known. Using a novel under-ice trawl, the HGF Young Investigators Group *Iceflux* aimed to investigate the relationship of the under-ice community with physical habitat properties as a prerequisite to understanding future changes of the Arctic sea ice system. In addition, the *Iceflux* team collected samples of ice algae, phytoplankton and under-ice fauna for biomarker studies aimed at quantifying the dependency of these organisms on sea ice-derived carbon.

Work at sea

Under-ice fauna was sampled at 15 stations with a Surface and Under-Ice Trawl (SUIT; van Franeker et al. 2009), which was kindly provided by IMARES (Texel, NL). The SUIT was equipped with two parallel nets attached next to each other in the mouth opening of 2.01 m height: A shrimp net (7 mm half-mesh) covering 1.54 m of the opening, and a zooplankton net (0.3 mm mesh) covering 0.42 m of the opening. A bio-environmental sensor array was mounted in the SUIT frame, consisting of an Acoustic Doppler Current Profiler, a CTD probe with built-in fluorometer and altimeter, two spectral radiometers, and a video camera. After retrieval of the net, Polar cod, *Boreogadus saida* and ctenophores were extracted from the catch for quantification and size measurements. From each net, 50 % of the catch was immediately preserved in 4 % formaldehyde in seawater solution. From the remaining fraction, preliminary macrozooplankton densities (in ind.m^{-2}) were estimated. Several abundant species, as well as phytoplankton and sea ice biota, were preserved at -80°C for Compound-Specific Stable Isotope Analysis (CSIA).

Preliminary (expected) results

From the 15 SUIT hauls completed, 3 were conducted in open water, and 12 were conducted under various types of sea ice, including multi-year ice and scattered ice floes (Fig. 6.4.1). The average ice coverage of the under-ice hauls was 57 %. Modal ice thickness ranged between 60 cm in first-year floes, and 105 cm in multi-year ice floes. Bio-environmental profiles were obtained from each SUIT haul (Fig. 6.4.2).

The species composition of SUIT samples indicated a clear distinction between open water and under-ice communities. Under sea ice, samples were dominated in density by the ice-associated amphipod *Apherusa glacialis*. In open water, the pelagic amphipod *Themisto libellula* was most abundant. At several stations both in open water and under sea ice, the ctenophores *Beroe cucumis* and *Mertensia ovum* occurred in very high densities (Fig. 6.4.3). At station 248 only, high abundances of the sea slug *Limacina helicina* and the appendicularian *Oikopleura* spp. were observed, indicating that this station was hydrographically different from the neighbouring stations. The average density of Polar cod was 1.9 ind. 100 m^{-2} under sea ice, and 0.2 ind. 100 m^{-2} in open water. Their size ranged from 54 to 140 mm total length.

Conclusions

This first trawl survey of under-ice fauna in the Arctic Ocean gives evidence of a rich and diverse under-ice community that appears to be present virtually throughout the Eurasian Arctic deep-sea basins. The association of this community with the under-ice habitat indicates a possibly important role of ice algal production in the Arctic ecosystem. This observation agrees well with similar findings in the benthic communities and the sea ice itself during ARK-XXVII/3.

A **B**

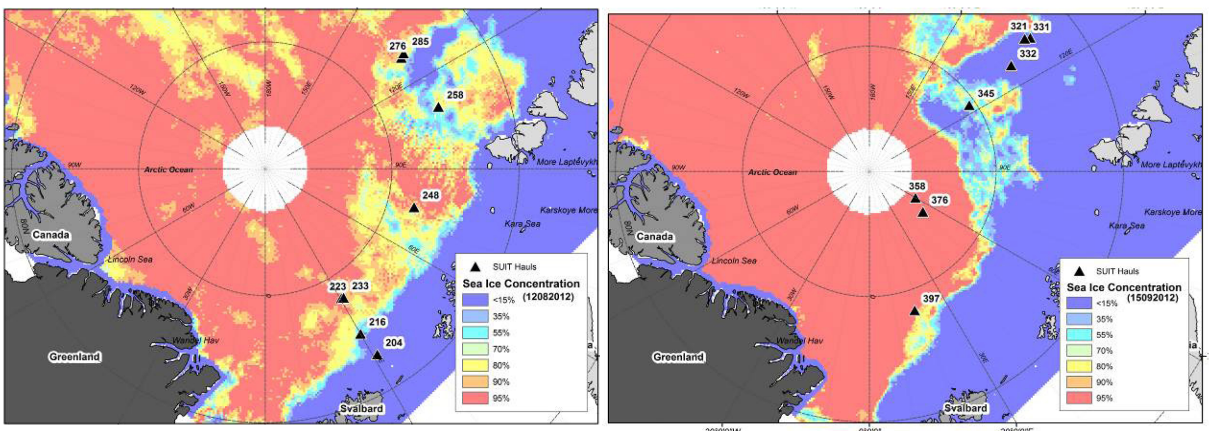

Fig. 6.4.1: Geographical positions of SUIT hauls during ARK-XXVII/3, projected on maps of sea ice concentration on (A) 12 August 2012, and on (B) 15 September 2012

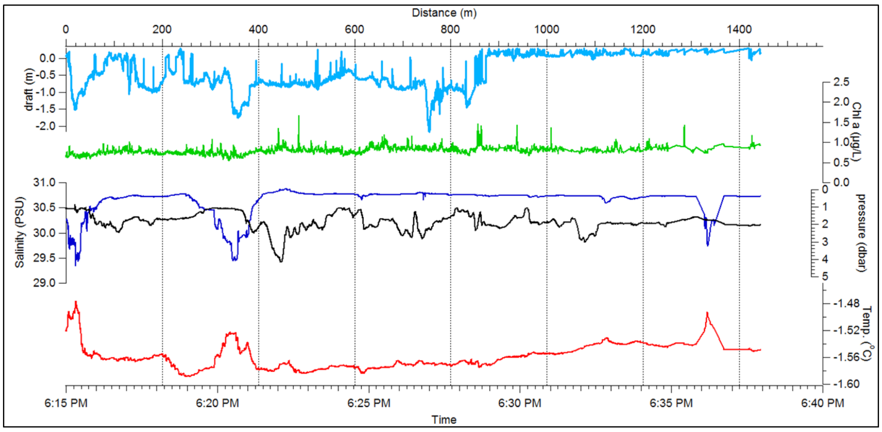

Fig. 6.4.2: Example of a sensor data profile during SUIT station PS80/285-1. Colour coding of data: Light blue: ice draft (calculated from depth and altimeter data); green: Chlorophyll a concentration; dark blue: salinity; black: pressure; red: water temperature

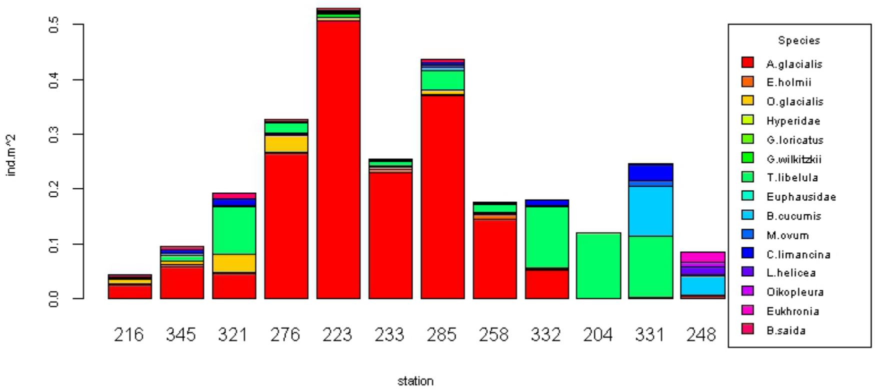

Fig. 6.4.3: Preliminary estimate of macrofauna species composition at SUIT hauls 1-12

References

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Data management sections 6.2 to 6.4

As soon as the data are available, they will be accessible to other cruise participants and research partners on request. Depending on the finalization of PhD theses and publications, data will be submitted to PANGAEA and SCAR-MarBIN and will be open for external use.

7. PLANKTON ECOLOGY

Catherine Lalande[1], Xiatong Xiao[1], Kerstin Oetjen[1], I. Peeken[1,2], Mar Fernández Méndez[1], Carmen David[1], Hauke Flores[1], Judith Piontek[3], Luisa Galgani[3]
not on board: Eva-Maria Nöthig[1], Barbara Niehoff[1], Katja Metfies[1], Anja Engel[3]

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[3]Geomar

Objectives

The Arctic Ocean experiences rapid environmental changes due to increasing temperatures, decreasing sea ice and acidification. The loss of Arctic sea ice is expected to enhance primary production in the Arctic pelagic ocean, and thereby the production of organic matter in the upper water column. These changes will have major implications for the entire pelagic ecosystem with possible impact on the carbon cycle and emission of aerosols. Recent studies also indicate that the production of carbon-rich gel particles by phytoplankton, also known as transparent exopolymer particles (TEP), is sensitive to changes in seawater CO_2 concentration. The PEBCAO group (Plankton Ecology and Biogeochemistry in a Changing Arctic Ocean) investigates unicellular plankton organisms including bacteria and zooplankton in the Arctic pelagic system as well as biogeochemical parameters such as dissolved and particulate organic carbon. Our aim is to contribute to a better understanding of the direction and strength of biological feedback processes in the future Arctic Ocean.

The PEBCAO program aims to continue ecological investigations of phyto- and protozooplankton species composition and of bacterial communities, biomasss, productivity, and related biochemical parameters such as chlorophyll a, particulate organic carbon & nitrogen, carbonate, and biogenic silica carried out in Arctic waters since the nineties in order to understand the eventually changes due to the rapidly changing Arctic environment. Specific questions will be: Are there regional differences in the seasonal distribution patterns of phyto- and zooplankton, and of biogeochemical parameters such as particulate organic carbon & nitrogen, carbonate and biogenic silica in the ice covered Arctic Ocean? What is the influence of the respective abiotic factors? Which are the most remarkable features? How important is the sea ice and biological processes within it for the pelagic food web and vertical particle flux? What changes can we measure in the water column and in vertical particle flux and what are the consequences of these changes for carbon sequestering?

The loss of organic matter within and below the euphotic zone is largely mediated by the degradation activity of heterotrophic bacteria, colonizing sinking particles and their surroundings. Hence, bacterial activity co-determines the efficiency of carbon export to the deep ocean. Furthermore, bacterioplankton plays a fundamental role at the basis of microbial foodwebs. The bioreactivity of particulate and dissolved organic matter is determined by its biochemical composition and diagenetic state. However, it is only poorly understood how the composition of organic matter and concentrations of specific compounds regulate bacterial activity in the pelagic ocean.

The objective of marine aerosol sampling is to investigate how organic colloids and gel particles in the sea-surface microlayer and in sea-spray derived organic aerosol vary as a function of biological activity in the surface ocean impacted by climate change. The aim is to explore chemical composition of organic matter within the sea surface microlayer and marine aerosol phase. The project is focused on the hypotheses that amount and composition of nano and micro particles in the sea-surface microlayer and in POA (primary organic aerosols) are influenced by biological productivity, as well as gel particles accumulation on the sea-surface is an important source for POA which will be altered by climate change. As a consequence, also the emission of POA from the ocean will be affected. The study of the sea-surface microlayer and of marine organic aerosol is intended to explore the dynamics occurring at the interface between ocean and atmosphere and the production and export of polymeric organic matter to the aerosol phase: in the Arctic region, where the climate changes faster than in any other place on earth, low-level Arctic clouds play a key role in regulating surface energy fluxes. Their radiative or reflective properties depend on aerosol particles available for condensation that can be formed by aggregates of polymeric organic material from the sea-surface microlayer as microgels produced by ice algae and phytoplankton in the surface water.

Work at sea

During the IceArc expedition, samples for PEBCAO were collected at 9 ice stations and along 5 transects.

Phytoplankton ecology

Samples for phytoplankton ecology investigations were taken from the CTD-rosette at 70 stations for nutrient measurements (Fig. 7.1a) and at 40 stations for basic biological and biogeochemical measurements (Fig. 7.1b), some of these stations representing ice stations. Samples for basic biological and biogeochemical measurements (chlorophyll a and HPLC pigments, particulate organic carbon and nitrogen (POC and PON), particulate biogenic silica (bPSi), and phytoplankton abundance) were taken at 5 or 6 depths from the surface to 100 m (including the depth of fluorescence maximum). Water was filtered on pre-combusted Whatman GF/F glass-fiber filters, polycarbonate, or cellulose acetate filters that were stored deep frozen for later analyses in the home laboratory, or samples were fixed and stored cool until enumeration. The abundances of autotrophic picoplankton, nanoplankton, and small microplankton were determined with the flow cytometer directly on board (Fig. 7.1c). Microscope identification and enumeration of larger nanoplankton and microplankton will be carried out later in the home laboratory at AWI. In addition, primary productivity was measured at 23 stations using the 14C method incubating the samples under stable temperature (-1.3°C) and a range of light intensities (0 - 400 $\mu E/m^2$ s) (Fig. 7.1d). Nutrient enrichment experiments were performed at 2 stations to determine the limiting factor for primary productivity.

At 30 stations samples have been taken at 3 - 6 depths in the upper 100 m of the water column to analyze dissolved organic carbon, combined carbohydrates and amino acids, and total alkalinity (Fig. 7.1e). Concentrations of carbohydrates and amino acids will be determined by the use of IC and HPLC, respectively. Furthermore, samples for transparent exopolymer particles (TEP) and Coomassie stainable particles (CSP) were stored at -20°C until analysis by photometry and microscopy back at the institute. At all stations bacterial activity was investigated by measurements of bacterial production and extracellular enzyme activities. Bacterial production was derived from uptake rates of radiolabelled thymidine and leucine. Enzyme activities were determined by the use of fluorescent substrate analogues. Samples for bacterial abundances were collected and will be analysed by flow cytometry.

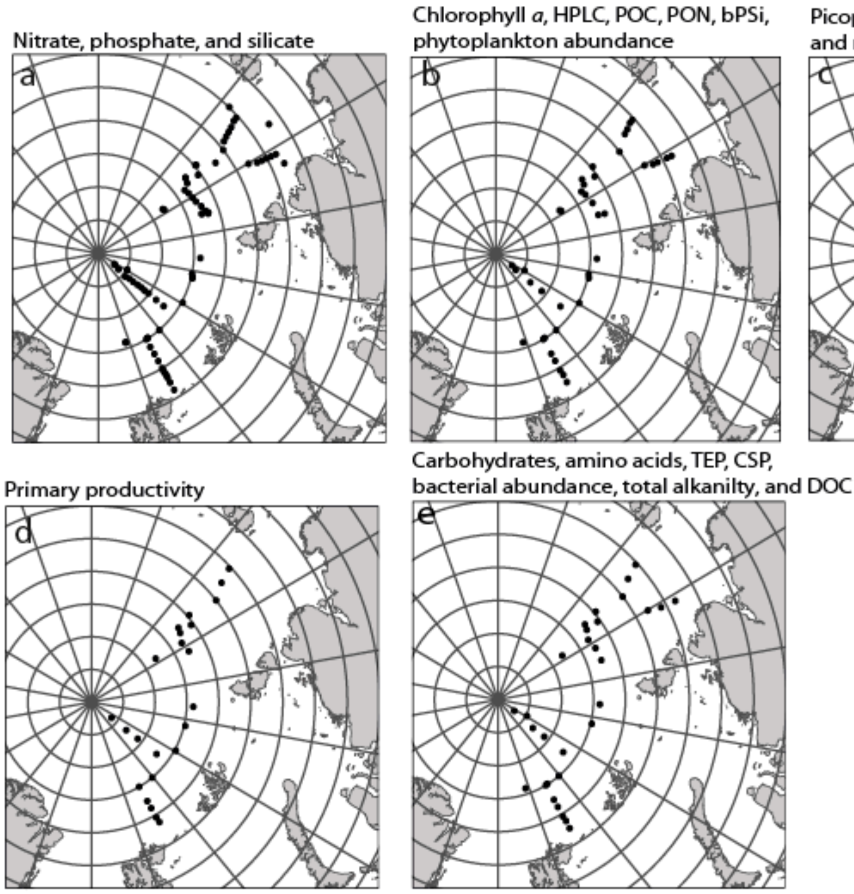

Fig.7.1: Stations sampled for different parameters during the IceArc expedition

Zooplankton

The vertical distribution of mesozooplankton was sampled at the 9 ice stations with a Multinet (0.25 m^2 mouth opening, five nets of 150 µm mesh size). Five depth layers were sampled between 1,500 m and surface. The samples were immediately preserved in 4 % formaldehyde for quantitative analysis after the cruise. On ice station 9, 2 Bongo net hauls were conducted to collect living organisms. The animals collected in the field will be used for physiological experiments at AWI to elucidate the influence of the zooplankton organisms on the microplankton community and on matter flux.

Export fluxes

Sediment traps which were deployed on 2 moorings near the Gakkel Ridge, 2 in the Nansen Basin and 2 in the Amundsen Basin, both deployed at ~200 m and ~150 m above the sea floor, during the TransArc cruise in 2011 were successfully recovered. The traps were equipped with 20 sampling jars that rotated every 2 weeks or 1 month to collect sinking particles at different periods of the year since last September. In addition, short-term sediment traps were deployed at 5 and 25 m at every ice stations for periods of 24 - 50 hours to measure the daily amount of particles exported under the ice. These combined measurements will help us to understand the importance of sea ice for production and export in the Arctic Ocean. All samples were poisoned and will be analyzed at the AWI home laboratory.

Marine aerosols

From open water or open meltponds the surface layer was sampled with the glass plate approach, wiping out the film sticking on both sides of the plate. This thin film has peculiar features in terms of physical, chemical and biological parameters that differ very much from the water below, e.g. at 20 cm already. Samples were also taken from the water below to be able to calculate enrichment/depletion of compounds. A total of 15 meltponds in 7 different ice stations were sampled, 3 open water spots with a zodiac quite far from the ship and 3 open leads in the pack ice when no open meltpond was found or no sampling with the zodiac was possible. Samples were collected for organic matter analysis in terms of carbohydrates, amino acids, organic carbon, gel particles and bacterial cell counts. To link sea-surface dynamics and CCN formation marine aerosols were sampled with a 5-stages low pressure Berner impactor (provided by IFT Leipzig). The aerosol sampler was positioned on the peil deck of Polarstern, connected to a pump, and it has been working during the whole cruise. Marine aerosols were collected on 5 different size ranges on pre-combusted aluminum foils, from 0.05 to 10 µm. In the size classes above 0.42 µm additionally to aluminum rings polycarbonate membranes were positioned aiming at collecting gel particles in terms of carbohydrate-like and protein-like composition for later laser scanning microscope analysis of these compounds in the aerosol phase. A total of 16 samples were collected, with different sampling time ranging from 48 hours to some days.

Preliminary (expected) results

Preliminary results from on board measurements indicate co-limitation of the three main nutrients: nitrate, phosphate and silicate in surface waters. In general the picoplankton and nanoplankton occurred in the thermal mixed layer of the upper 30 m. Only at station 248 and towards the end of the cruise this mixed layer was weakening and resulting in an increase of algae down to 70 m. Phytoplankton carbon was in the surface in the range of 5 - 30 µgC/L with of up to 65 µg/L in the marginal ice zone north of Spitsbergen (30°E). Most important in terms of biomass was the small nanoplankton fraction between 3 - 10 µm. First results on bacterial activity reveal regional differences in bacterial production that co-vary with distance to the ice edge, the degree of ice coverage and the distribution of first year ice and multi year ice. The sediment trap samples from the Amundsen and Nansen Basins indicated that the amount of particles exported varied during the year, with lower amounts of material exported during winter when there is no production in the upper ocean. We also observed large filamentous algae in the last 3 cups of the sediment traps, indicating that these algae have been produced in the region during the past 1 ½ month and have rapidly sank to the bottom (Fig. 7.2).

Fig. 7.2: Sediment trap samples from the Nansen Basin near the Gakkel Ridge

Data management

Almost all sample processing will be carried out in the home laboratory at AWI. It usually takes up to three years depending on the parameter as well as analysis methods (chemical measurements or tedious swimmer picking in trap material and species enumerations and identifications, respectively). As soon as the data are available they will be accessible to other cruise participants and research partners on request. Depending on the finalization of PhD theses and publications, data will be submitted to PANGAEA and SCAR-MarBIN and will be open for external use.

8. BENTHIC BIOLOGY AND BIOGEOCHEMISTRY

Benthic communities at the Arctic deep-sea floor depend on the sedimentation of particulate matter from sea ice and the water column, which is determined by temporal and spatial variations in the vertical export flux from the euphotic zone, and by lateral supply from shelf areas. Most organic matter is recycled in the pelagic realm, but a significant fraction of the organic material ultimately reaches the seafloor, and is either remineralized or retained in the sediment record. One of the central questions about the consequences of the shrinking sea ice cover is to what extent primary production and subsequent export of organic matter to the seafloor will be affected, and how this will influence the structure and functioning of benthic communities in the Arctic.

8.1 Megafauna surveys and trawling

Antonina Rogacheva[1], Elena Rybakova[1], Renate Degen[2]

[1]IORAS
[2]AWI

Objectives

Benthic megafauna plays an important role in the oceanic carbon cycle, as they are major consumers of organic matter exported from surface waters and the sea ice. The benthic fauna of the Central Arctic basin is so far poorly explored due to difficulties of taking samples in areas with high ice coverage. The main objective of this work was to investigate biodiversity, abundance and biomass of megafauna, and their relation to different environmental aspects such as varying ice coverage.

Work at sea

Data on megafauna were retrieved from all ice stations (4 in the Nansen and 5 in the Amundsen Basin) using both OFOS (Ocean Floor Observation System, AWI) for areal observations and Agassiz trawl for fauna sampling (Tab. A3). Both gears were additionally deployed during a test station in the Barents Sea. OFOS, a towed underwater camera, was used to conduct photographic transects. Photographs were taken every 20 - 25 seconds at an altitude of 1,5 m. This resulted in an aerial coverage of approx. 3 – 4 m^2. Biota, algal deposits and *Lebensspuren* were counted on approximately 100 images from each transect in order to get first quantitative results. Each OFOS dive was followed by an Agassiz trawl (AGT) deployment sampling part of the photo transect when the ice conditions were appropriate. From the retrieved AGT samples wet biomass was estimated for each transect. Fauna samples were preserved in 96 % ethanol or 4 % formaldehyde for taxonomic identifications. Samples for molecular phylogeny, trophic analysis and gonad histology were also taken.

Preliminary results

The areas studied represent flat sedimented abyssal plains inhabited by soft-bottom megafaunal communities with low biodiversity; so far only 35 taxa were recognised on the images. The most common taxa were actiniarians (Fig. 8.1.1 C) and sea cucumbers Kolga and Elpidia (Fig. 8.1.1 D, G). *Kolga hyalina* and actiniarians dominated the megafauna in terms of biomass on most of the transects. Ophiuroid *Ophiostriatus striatus* (Fig. 8.1.1 H) was among the dominant species at ice station 2 and 3 but were not observed at the other stations.

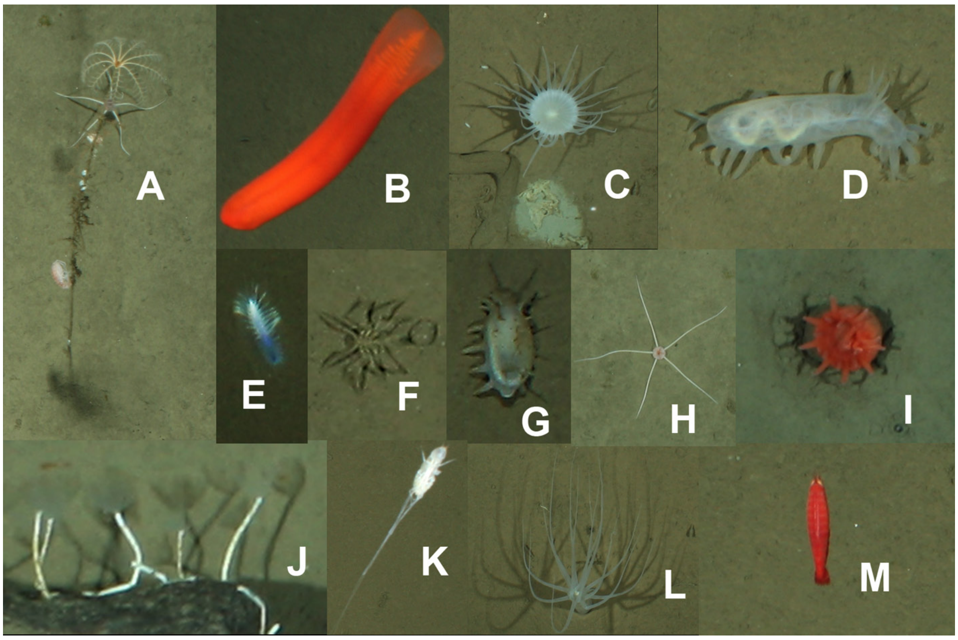

Figure 8.1.1: Common representatives of the Nansen and Amundsen Basins. A, crinoid Bathycrinus carpenteri with epibionts on its stalk; B, nemertean; C, I, actiniarians; D holothurian Kolga hyalina; E, swimming polychaete; F, pycnogonid; G, holothurian Elpidia heckeri; H, ophiuroid Ophiostriatus striatus; J, serpulid polychaetes; K, isopod; L, ceriantharian; M, amphipod Anonyx nugax

Despite low biodiversity, megafaunal distribution was surprisingly uneven showing high variation in biomass and abundance. The highest estimated biomass (5.5 g/m^2) was measured at ice station 6 and was mainly composed of aggregations of *Kolga hyalina* with an average density of 1.7 ind./m^2. Comparatively high biomass was also estimated for ice stations 5 and 4, where many stalks of dead hexactinellid sponges were observed. The highest densities exceeding 3 ind./m^2 were found at station 4, 5 and 6. The most abundant groups at these stations were *Kolga hyalina, actiniarians and isopods*. The lowest biomasses were observed at ice station 1 and 8 but still dominated by *Kolga hyalina*.

Ice algae play an important role for Arctic deep-sea benthic communities as they represent a valuable source of organic matter. Based on our observations, in some areas settling algal aggregates cover up to 10 % of the seafloor. Some benthic animals, i.e. sea cucumbers and ophiuroids, were observed feeding on those algae deposits. However, so far we couldn't find any direct relation between megafaunal biomass and abundance with density of algal aggregations. This interesting question requires more detailed investigations.

Data management

Please refer to the end of this chapter on page 58.

8.2 Benthic communities (meio- and macrofauna)

Renate Degen[1], Antonina Rogacheva[2], Elena Rybakova[2]

[1]AWI
[2]IORAS

Objectives

Deep-sea benthic communities entirely rely on the carbon input of the productive layer and are therefore ideal indicators of environmental changes. In the Arctic the spring bloom of ice algae and the release of sinking algal mats is of vital importance for the benthic food web as it provides an early food source after the long period of winter starvation. With the now observed shrinking of the sea ice cover the central question is to what extent primary production and subsequent export of matter to the seafloor will be affected, and how this will influence the structure and functioning of benthic communities. To investigate this relationship and to detect potential differences in community composition, biomass and diversity of the benthos we sampled the seafloor at ice-free stations, at the ice edge and below first and multi year sea ice.

Work at sea

Sediment samples for macrofauna analyses (collaboration with T. Brey, AWI; A. Gebruk, IORAS) were taken using the multi-box corer (Gerdes 1990), a sample device providing nine samples over a sampling area of 2 - 3 m^2. Four quantitative (0 – 4 cm and 4 – 10 cm) and four qualitative (0 – 4 cm) samples each were taken, washed through 500 µm sieves and fixed in 4 % Formaldehyde or stored in 75 % Ethanol respectively. One sample box per station was shared with the AWI Geoscience department (X. Xiao, R. Stein). Additional macrofauna as well as meiofauna samples (collaboration with P. Martinez Arbizu, Senckenberg) were retrieved from the bottom LANDER chambers (see section 4). The bulk of meiofauna samples were obtained from the multi corer, where three cores per station were processed if available. The cores were cut at 0 - 1 cm, 1 - 5 cm and 5 - 10 cm from the surface downwards and the samples fixed in 4 % buffered Formaldehyde. If an additional core was available the uppermost cm was stored in 95 % Ethanol for later genetic analyses.

Preliminary results

A total of 22 MUC, 12 Lander and 7 Multigrab samples of macro- and meiofauna have been taken (Tab. A4). Identification of fauna and assessment of biomass will be performed later in the home laboratories.

Data management

Please refer to the end of this chapter on page 58.

8.3 Benthic microbiology

Christina Bienhold[1,2], John Paul Balmonte[3], Wiebke Rentzsch[1], Rafael Stiens[1]

[1]MPI
[2]AWI
[3]UNC

Objectives

The long-term and short-term variations in sea ice and ocean productivity and carbon export are main drivers of the structure and functioning of benthic communities, as indicated by the relationships between biomass and diversity of various benthic taxa and size classes with gradients in organic matter availability in the Arctic (Vanaverbeke et al. 1997, Boetius and Damm 1998, Soltwedel et al. 2009, Bienhold et al. 2012). The major objectives for ARK-XXVII/3 were to compare benthic bacterial diversity and functions (e.g. biomass, enzymatic hydrolysis) under different ice situations, including ice-free stations, stations at the ice edge and in the ice. In addition, transects along the Laptev Sea continental slope were sampled, in order to compare bacterial communities and their functions to those of samples from 1993 (Boetius & Damm 1998), when the Laptev Sea was still partly ice-covered even in summer.

Work at sea

Sediment samples for microbiological and biogeochemical analyses were retrieved at all Multicorer stations (Tab. A5). The Multicorer was equipped with a video camera (TV-MUC) and videos of the seafloor are available for most stations. Multicorer cores were subsampled in three depth layers (0 - 1 cm, 1 - 5 cm, 5 - 10 cm) and further processed in the cooling container at 0°C. Sediment samples were fixed for several microbiological and geochemical analyses that will be conducted in the home laboratory (Tab. A6). Measurements of extracellular enzyme activities and chlorophyll pigment contents were conducted directly on board. A list of all Multicorer stations and sample distribution between working groups can be found in Appendix Tables A5 and A7.

Preliminary (expected) results

The retrieved sediment samples will provide further insights into the distribution and function of benthic life of all size classes in the Arctic (in collaboration with T. Brey, AWI; P. Martinez Arbizu, Senckenberg; A. Gebruk, IORAS). As expected, the shallower continental slope stations in the Laptev Sea showed much higher values of chlorophyll pigments (a proxy for sedimented phytodetritus) than the deep Arctic basins (2 - 13 µg/ml CPE along the slope transects, 0.5 - 1.4 µg/ml CPE in the deep-sea basins). The patchily distributed food falls of ice algae seemed to be most efficiently consumed by the megafauna (holothurians *Kolga hyalina* and *Elpidia heckeri*), and potential activities of extracellular bacterial enzymes were low in surrounding sediments (e.g. 0.02 - 0.8 µM h^{-1} for beta-glucosidase, and 0.02 - 2.3 µM h^{-1} for chitobiase). The signature of algae falls in the sedimentary archive will be further analysed in the home laboratory using specific ice-algal biomarkers (R. Stein, AWI). In a joint project with AWI, GEOMAR and the University of North Carolina at Chapel Hill, microbial detritus recycling efficiencies of the pelagic and benthic realms under varying degrees of ice coverage will be compared to gain insight into functional differences in the heterotrophic degradation of carbon, and how community function and composition is affected by retreating ice. Preliminary enzymatic activity measurements (Balmonte, JP, UNC) using MCA-tagged amino acid monomers indicate a positive correlation between primary production and enzyme hydrolysis rates in the surface water. Enzymatic activity data using polysaccharide substrates will be acquired after analyses at UNC Chapel Hill, though expected results are that hydrolysis efficiencies will decrease with increasing latitude, which has been previously documented by Arnosti et al. (2011).

First on-board results for the Laptev Sea transects show that both chlorophyll pigment concentrations and enzyme activities (beta-glucosidase, chitobiase) decreased with increasing water depth and decreasing food availability. The measured values are still in the range of data from sampling the area almost 20 years ago (Boetius & Damm 1998, ARK-IX/4).

Data management

Please refer to the end of this chapter on page 58.

8.4 Benthic respiration rates and biogeochemical fluxes

Frank Wenzhöfer[1], Janine Felden[1,2], Steffen Jescheniak[1], Jörn Patrick Meyer[1], Axel Nordhausen[1]

[1]AWI/MPI
[2]Marum

Objectives

The benthic oxygen distribution provides detailed information on the turnover of sedimenting organic material, fauna activity and the biogeochemical reactions of the sediment. Only a minor part of the oxygen is used for animal respiration, while microbial heterotrophic activity is responsible for the major part of the benthic oxygen requirement. Thus benthic oxygen fluxes provide a good integrated measurement of the respiratory metabolic activity in surface sediments (Boetius and Damm 1998; Wenzhöfer and Glud 2002). They can be converted to benthic carbon mineralization rates and thus can be used to evaluate carbon input to the seafloor.

Work at sea

Benthic exchange and mineralization rates were measured *in-situ* with 3 Benthic Lander systems and *ex-situ* on MUC cores from selected stations (Tab. A7). Each of the used Lander systems was equipped with three benthic chamber modules and one X-Y Microprofiler. The benthic chambers were used to measure total oxygen uptake (TOU) and nutrient exchange of the sediment integrating all relevant solute transport processes (diffusion, advection and fauna-mediated transport) and an area of 400 cm^2. During the deployment an oxygen optode measured changes in oxygen concentration and 7 syringes took water samples in pre-programmed time intervals for analyses of dissolved inorganic carbon (DIC) and nutrients. Furthermore, the enclosed and retrieved sediments were sampled for total organic carbon content (TOC), abundances of microbes, meio- and macrofauna. The X-Y microprofiler was used to quantify diffusive oxygen uptake (DOU), which is generally assigned to microbial respiration. Each microprofiler was equipped with six oxygen, two pH, one temperature and one resistivity microsensor. The measurements across the water-sediment interphase were performed with a vertical resolution of 150 µm and a total length of 15 cm. During the deployments the microprofiler performed five vertical profiles separated by 10 cm. At each site 3 Lander systems were deployed simultaneously, except for the first and last station (Tab. A8).

Ex-situ oxygen microprofiles were measured with a motorized micromanipulator set up at *in-situ* temperature in an oxygenated water bath on board (Tab. A7).

Preliminary (expected) results

A total of 17 Lander deployments were completed at seven different stations (Tab. A8). Overall, benthic oxygen consumption (DOU, TOU) in the Arctic is very low (< 1 mmol $m^{-1}d^{-1}$) and mainly due to microbial carbon mineralization as indicated by similar DOU and TOU rates. The first rough exploration of the nearly 250 microsensor oxygen profiles showed that oxygen consumption is limited to the first centimeter of the sediment, resulting in oxygen penetration depth of more than 10 cm. However, benthic oxygen consumption was significantly enhanced up to one order of magnitude as soon as the carbon availability increased due to sunken sea ice algae (Boetius et al. 2013). When profiling through such aggregates enhanced oxygen uptake rates were observed (Fig. 8.4.1).

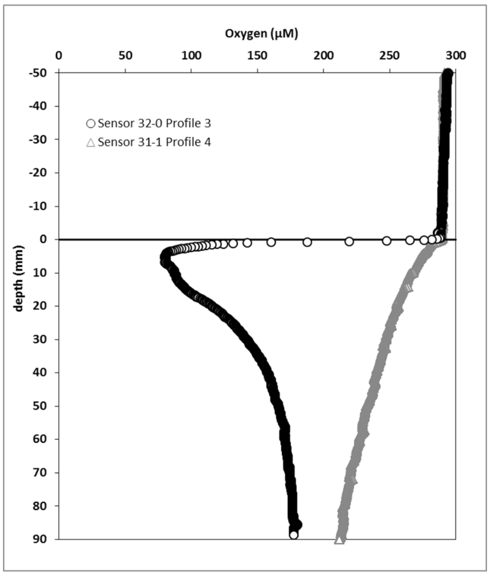

Fig. 8.4.1: Two oxygen microsensor profiles measured in a distance of approximately 10 cm from each other. Profile 3 showed higher oxygen consumption at the first millimeter of the sediment due to the high organic carbon input by ice algae. Profile 4 is more "normal" oxygen profile for oxygen concentration in arctic deep sediment and similar to all the other Lander stations of the ARK-XXVII/3 cruise

Data management

The station list and all metadata from sampling and observations have been stored in the WDC MARE data base PANGAEA (http://www.pangaea.de). Further scientific data retrieved from observations, measurements and home-based data analyses have been submitted to PANGAEA either upon publication, or with password protection by the individual P.I.s as soon as the data are available and quality-assessed (doi:10.1594/PANGAEA.803293). This includes also some biological data, for most of which parameters are already defined in PANGAEA. Molecular data will be deposited in globally accessible databases such as GenBank. For benthic images, photos have been deposited in the data base BIIGLE, and a video database is under construction at AWI and the research center MARUM (Bremen), which will be accessible to taxonomic specialists. All zoological samples will be stored at U Oldenburg, AWI, and IORAS (Meio-, Macro- and Meiofauna), and all microbiological samples are stored deep frozen or fixed at the MPI in Bremen.

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9. HYDROSWEEP AND PARASOUND

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Technical introduction

The Atlas Hydrosweep DS-3 and Atlas Parasound P-70 are hull-mounted multibeam and sub-bottom profiling echosounders on board *Polarstern*.

The Hydrosweep is a deep sea multibeam echosounder used for sea floor mapping. It transmits a fan-like sound pulse perpendicular to the ship's track down to the sea floor. The received echo is separated in 141 preformed beams by a beam forming filter. Each beam represents a depth measurement consisting of a travel time and across/along track angles from the centre beam. After applying a sound speed profile of the water column's layers, horizontal metric distances from each beam to the centre beam and the vertical distance from each beam's sea floor footprint to the transducer's surface are calculated. To reference the measured depths in a global reference system further sensors are required. The current ship's position is measured by a Trimble GPS receiver. The ship's roll, pitch and heading angles, and heave are continuously measured by the Raytheon Anschütz MINS2 (Marine Intertial Navigation System). By applying all these values and the surveyed offsets between all sensors to the beam data, all measured depth values can be referenced in a global coordinate system. The resulting data can be charted in maps or used to calculate digital elevation models.

The Hydrosweep's transducer frequency ranges from 13.6 to 16.4 kHz. Fillinger (2012) recommends a swath width setting of 85 - 120 % of the water depth for deep sea operation (>1,000 m water depth). Each ping results in a depth profile of 141 preformed hard beams which are increased to up to 345 soft beams by algorithms.

The Parasound sub-bottom profiler is a seismic system used to detect the internal structures of sedimentary cover along the ship's track. To penetrate the sedimentary layers at the sea floor, a low frequency signal is required. To combine a reasonably small transducer with a very narrow beam the system takes advantage of the parametric effect, which results from the non-linear hydro-acoustic behaviour of water for high energy signals. The transmission of 2 high energy signals of slightly different frequencies (i. e. 18 kHz and 22 kHz) creates harmonics at the difference frequency (i. e. 4 kHz) and the frequency sum (i. e. 40 kHz). With variable frequencies from 0.5 kHz to 6 kHz and an opening angle of approximately 4 degrees the system provides high resolution information of the sedimentary layers up to a depth of 200 m below sea floor. The system compensates ship's movements by applying roll, pitch and heave values from the MINS. Navigation data is received by a Trimble GPS receiver.

Objectives

During the IceArc cruise the *Polarstern* operated in Arctic regions that were never charted by AWI before, either due to different research areas or further operational restrictions. Therefore the main objective of this cruise was to collect a maximum amount of Hydrosweep and Parasound data along the cruise track which will be very valuable for the AWI Bathymetry as well as the AWI Geology department.

The Hydrosweep DS-3 system has been installed in October 2010 and still can be considered to be in trial state. Therefore another objective was the careful observation and reporting of the system's performance.

Work at sea

The Hydrosweep was in operation 24 hours per day. System parameters were regularly adjusted to the sea and ice conditions in the echosounder operator software Hydromap Online. Data was recorded and visualized with Hypack 2011. Sound speed profiles from CTD measurements carried out by the physical oceanography group were regularly applied to Hypack and to Hydromap Online. Hypack produces HSX files which were imported to CARIS HIPS 7.0 for inspection and quick gridding. The subset editor of CARIS HIPS was used to roughly reject incorrect multibeam data.

The Parasound was also in operation 24 hours per day. The echosounder was set to 20 kHz desired primary high frequency (PHF) and 4 kHz secondary low frequency (SLF). Data of these 2 frequencies were recorded in the formats ASD, PS3 and SGY.

Preliminary results

The collected data covers a long transect through the Nansen Basin from within the Russian EEZ in the east to the Yermak Plateau in the west, the southern part of the Amundsen Basin as well as parts of the Laptev Sea shelf and shelf edges. The Gakkel Ridge that divides the Amundsen and Nansen Basins was crossed five times between 40°E north of Franz Josef Land and 120°E close to the Laptev Sea shelf edge. The transit back to Bremerhaven also covers the Yermak Plateau, parts of the Knipovich Ridge and the Norwegian Basin.

Additionally, the Karasik Seamount that was first observed in 2001 was crossed once again and a profile parallel to existing profiles was charted. This seamount close to the Gakkel Ridge ranges from 4,000 m to 600 m depth.

Data collected from both echosounders are in an unprocessed state. Heavy ice conditions and inadequate ship speeds for echosounding partly affected the quality of the data. The final processing and interpretation of the data will be done postcruise. Any systematic system failures were or will be reported to the charterer and to the responsible AWI groups.

Data management

The data is transferred to the AWI Bathymetry and Geology departments for post-processing and will be made available in the scientific data warehouse PANGAEA.

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APPENDIX

A.1 PARTICIPATING INSTITUTIONS

A.2 CRUISE PARTICIPANTS

A.3 SHIP'S CREW

A.4 STATION LIST

A.5 ADDITIONAL FIGURES AND TABLES

A.1 PARTICIPATING INSTITUTIONS

	Address
AWI	Alfred-Wegener-Institut Helmholtz–Zentrum für Polar- und Meeresforschung in der Helmholtz-Gemeinschaft Am Handelshafen 12 27515 Bremerhaven Germany
AARI	Arctic and Antarctic Research Institute, 199397 Beringa st. 38, St-Petersburg, Russia
DWD	Deutscher Wetterdienst Geschäftsbereich Wettervorhersage Seeschifffahrtsberatung Bernhard Nocht Str. 76 20359 Hamburg Germany
Fielax	FIELAX Gesellschaft fuer wissenschaftliche Datenverarbeitung mbH Schleusenstr. 14, 27568 Bremerhaven, Germany
HeliService	HeliService International GmbH Am Luneort 15 D-27572 Bremerhaven, Germany
GEOMAR	GEOMAR | Helmholtz-Zentrum für Ozeanforschung Kiel Düsternbrooker Weg 20, D-24109 Kiel, Germany
IMARES	Institute for Marine Resources and Ecosystem Studies, The Netherlands P.O. Box 167, 1790 AD Den Burg (Texel)
IORAS	P.P. Shirshov Institute of Oceanology Russian Academy of Science, Russland 36 Nachimovsky prospect, Moscow, 117851, Russland,
MPI	Max Planck Institute for Marine Microbiology, Deutschland Celsiusstr. 1, 28359 Bremen, USA

	Address
NIOZ	Royal Netherlands Institute for Sea Research P.O. Box 59, 1790 AB Den Burg, The Netherlands
OPTIMARE	OPTIMARE Sensorsysteme AG, Deutschland Am Luneort 15a, 27572 Bremerhaven, Deutschland
SDU	University of Southern Denmark Institute of Biology, Campusvej 55, DK-5230 Odense M, Denmark
UAB/ICTA	Institut de Ciència i Tecnologia Ambientals (ICTA) Universitat Autònoma de Barcelona, Spain 08193 Bellaterra. Spain
UAF	University of Alaska Fairbanks Geophysical Institute 505 South Chandalar Drive Fairbanks, AK 99775, USA
U Alberta	University of Alberta, Dep. Earth & Atmospheric Sciences, Canada Edmonton, Alberta, T6G 2E3 Canada
UDEL	University of Delaware Video/Image Modeling and Synthesis (VIMS) Lab., Dept. of Computer and Information Sciences Newark, DE 19716-271
UNC	University of Northern Carolina, USA Chapel Hill, NC 27599-3300

A.2 CRUISE PARTICIPANTS

Name/ Last name	Vorname/ First name	Institut/ Institute	Beruf/ Profession
Albrecht	Sebastian	Fielax	Data manager
Attard	Karl	SDU	Biogeochemist
Bakker	Karel	NIOZ	Geochemist
Balmonte	John-Paul	UNC	Student, Biogeochemistry
Bienhold	Christina	AWI/MPI	Biologist
Boetius	Antje	AWI/MPI	Scientist (Chief Scientist)
Brauer	Jens	HeliService	Technician, Heli
David	Carmen	AWI	Biologist
Degen	Renate	AWI	Biologist
Felden	Janine	AWI/MPI/ MARUM	Biogeochemist
Fernandez	Mar	AWI/MPI	Biologist
Flores	Hauke	AWI	Biologist
Galgani	Luisa	IFM GEOMAR	Biologist
Hammrich	Klaus	HeliService	Pilot
Hempelt	Juliane	DWD	Technician, Meteorology
Hendricks	Stefan	AWI	Physicist
Istomina	Larisa	UNI Bremen/ AWI	Physicist
Jescheniak	Steffen	MPI	Technician, Biogeochemistry
Katlein	Christian	AWI	Student, Sea Ice Physics
Kirschenmann	Eva	AWI	Student, Biogeochemistry
Krumpen	Thomas	AWI	Physicist
Lalande	Catherine	AWI	Biologist
Lange	Benjamin	U Alberta	Physicist
Le Guitton	Marie	NIOZ	Geochemist
Lindner	Roland	HeliService	Pilot
Meyer	Jörn Patrick	AWI/MPI/ MARUM	Technician, Biogeochemistry
Miller	Max	DWD	Meteorologist
Müller	Thomas	HeliService	Technician, Heli
Nicolaus	Marcel	AWI	Physicist
Nordhausen	Axel	MPI	Technician, Biogeochemistry
Oetjen	Kerstin	AWI	Technician, Biology
Peeken	Ilka	AWI/MARUM	Biologist
Piontek	Judith	IFM GEOMAR	Biologist

Name/ Last name	Vorname/ First name	Institut/ Institute	Beruf/ Profession
Puigcorbé	Viena	UAB/ICTA	Environmental scientist
Rabe	Benjamin	AWI	Oceanographer
Rentzsch	Wiebke	AWI/MPI	Technician, Biogeochemistry
Rettig	Stefanie	AWI	Technician, Oceanography
Rhyzhov	Ivan	AARI	Student, Oceanography
Roca	Montserrat	UAB/ICTA	Environmental scientist
Rogacheva	Antonina	IORAS	Biologist
Rybakova	Elena	IORAS	Biologist
Sander	Hendrik	Optimare	Technician, Oceanography
Schiller	Martin	AWI	Technician, Sea Ice Physics
Scholz	Daniel	AWI	Student, Geochemistry
Somavilla-Cabrillo	Raquel	AWI	Oceanographer
Sorensen	Scott	UAF	Physicist
Sørensen	Heidi Louise	SDU	Biogeochemist
Stecher	Anique	AWI	Biologist
Stiens	Rafael	AWI/MPI	Technician, Biogeochemistry
Thuroczy	Charles-Edouard	NIOZ	Geochemist
Uhlig	Christiane	AWI, U Konstanz	Biologist
van Dorssen	Michiel	v.D. Metaalbew./AWI	Technician, Biology
Wenzhöfer	Frank	AWI/MPI	Biogeochemist
Xiao	Xiaotong	AWI	Geologist

A.3 SHIP'S CREW

No.	Name	Rank
1.	Pahl, Uwe	Master
2.	Spielke, Steffen	1. Offc.
3.	Ziemann, Olaf (Ole)	Ch. Eng.
4.	Lauber, Felix	2. Offc.
5.	Peine, Lutz	2. Offc.
6.	Hering, Igor	3. Offc.
7.	Spilok, Norbert	Doctor
8.	Koch, Georg (Schorsch)	R. Offc.
9.	Kotnik, Herbert	2. Eng.
10.	Schnürch, Helmut	2. Eng.
11.	Westphal, Henning	2. Eng.
12.	Brehme, Andreas	Elec. Eng.
13.	Fröb, Martin	ELO
14.	Muhle, Helmut	ELO
15.	Winter, Andreas	ELO
16.	Feiertag, Thomas	ELO
17.	Clasen, Burkhard	Boatsw.
18.	Neisner, Winfried	Carpenter
19.	Schultz, Ottomar	A.B.
20.	Burzan, Ekkehard	A.B.
21.	Schröder, Norbert	A.B.
22.	Moser, Siegfried	A.B.
23.	Hartwig-Labahn, Andreas	A.B.
24.	Kretschmar, Uwe	A.B.
25.	Kreis, Reinhard	A.B.
26.	Schröter, Rene	A.B.
27.	Beth, Detlef	Storek.
28.	Skibbe, Willi	Mot-man
29.	Fritz, Günter	Mot-man
30.	Krösche, Eckard	Mot-man
31.	Dinse, Horst	Mot-man
32.	Watzel, Bernhard	Mot-man
33.	Fischer, Matthias	Cook
34.	Tupy, Mario	Cooksmate
35.	Völske, Thomas	Cooksmate
36.	Dinse, Petra	1. Stwdess

No.	Name	Rank
37.	Hennig, Christina	Stwdess/N.
38.	Streit, Christina	2. Stwdess
39.	Chen, Quan Lun	2. Steward
40.	Wartenberg, Irina	2. Stwdess
41.	Hu, Guo Yong	2. Steward
42.	Hirschke, Peggy	2. Stwdess
43.	Ruan, Hui Guang	Laundrym.
44.	Strache, Axel	Apprentice
45.	Hammerschmied, Michael	Apprentice

A.4 STATION LIST

Gear abbrevations:

AGT	Agassiz Trawl
BONGO	Bongo Net
CTD	CTD
HS	Hydrosweep Multibeam Echosounder
ICE	Ice Floe Station
ISP	In situ pump
LANDER	Chamber/Profiler Lander
MG	Multi Grab
MN	Multiple Net
MOR	Mooring Oceanography
OFOS	Ocean Floor Observation System
PS	Parasound Sediment Echosounder
RO	Rosette water sampler
ROV	ROV SONIA
SUIT	Under Ice Trawl
TVMUC	TV-Multicorer
XCTD	Expendable CTD

Station	Date	Time	Gear	Action	Position Lat	Position Lon	Water depth [m]
PS80/199-1	03.08.2012	08:55	CTD/RO	on ground/max depth	73°4.90'N	18°11.96'E	437
PS80/200-1	05.08.2012	06:26	CTD/RO	on ground/max depth	80°29.88'N	29°59.76'E	372
PS80/201-1	05.08.2012	10:19	CTD/RO	on ground/max depth	81°0.21'N	29°58.90'E	160
PS80/202-1	05.08.2012	13:03	CTD/RO	on ground/max depth	81°20.02'N	30°1.17'E	201
PS80/202-2	05.08.2012	13:51	XCTD	on ground/max depth	81°23.89'N	30°5.49'E	247
PS80/203-1	05.08.2012	15:50	LANDER	on ground/max depth	81°26.85'N	31°6.81'E	398
PS80/204-1	05.08.2012	16:40	SUIT	profile start	81°27.27'N	31°4.76'E	464
PS80/204-1	05.08.2012	17:05	SUIT	profile end	81°28.54'N	31°1.83'E	589
PS80/205-1	05.08.2012	18:33	AGT	profile start	81°28.81'N	31°1.51'E	615
PS80/205-1	05.08.2012	18:43	AGT	profile end	81°28.97'N	31°2.02'E	628
PS80/206-1	05.08.2012	20:21	OFOS	profile start	81°27.197'N	31°11.975'E	418
PS80/206-1	05.08.2012	21:32	OFOS	profile end	81°27.543'N	31°11.80'E	469
PS80/207-1	05.08.2012	22:57	TVMUC	on ground/max depth	81°27.20'N	31°13.56'E	400
PS80/207-2	05.08.2012	23:36	TVMUC	on ground/max depth	81°27.13'N	31°13.25'E	392
PS80/207-3	06.08.2012	00:25	TVMUC	on ground/max depth	81°27.12'N	31°13.25'E	392
PS80/208-1	06.08.2012	01:52	CTD/RO	on ground/max depth	81°27.74'N	31°3.26'E	530
PS80/208-2	06.08.2012	02:56	CTD/RO	on ground/max depth	81°27.77'N	31°5.84'E	510
PS80/208-3	06.08.2012	04:05	CTD/RO	on ground/max depth	81°27.60'N	31°6.25'E	501
PS80/208-4	06.08.2012	05:09	CTD/RO	on ground/max depth	81°27.58'N	31°5.89'E	500
PS80/209-1	06.08.2012	07:04	CTD/RO	on ground/max depth	81°29.61'N	30°10.33'E	709
PS80/209-2	06.08.2012	14:28	XCTD	on ground/max depth	81°30.03'N	30°0.08'E	789
PS80/209-3	06.08.2012	15:17	XCTD	on ground/max depth	81°37.50'N	29°59.97'E	2274
PS80/210-1	06.08.2012	08:12	MN	on ground/max depth	81°29.73'N	30°11.03'E	718
PS80/211-1	06.08.2012	10:26	POS	profile start	81°28.24'N	30°47.26'E	588
PS80/211-1	06.08.2012	10:26	POS	profile end	81°28.24'N	30°47.26'E	588
PS80/212-1	06.08.2012	16:42	CTD/RO	on ground/max depth	81°39.99'N	29°59.81'E	2528
PS80/212-2	06.08.2012	18:25	XCTD	on ground/max depth	81°46.61'N	30°0.03'E	2984
PS80/213-1	06.08.2012	20:10	CTD/RO	on ground/max depth	81°50.15'N	29°57.23'E	3152
PS80/213-2	06.08.2012	21:48	XCTD	on ground/max depth	81°55.42'N	29°59.85'E	3244

Station	Date	Time	Gear	Action	Position Lat	Position Lon	Water depth [m]
PS80/214-1	06.08.2012	23:42	CTD/RO	on ground/max depth	82°0.15'N	29°59.90'E	3374
PS80/214-2	07.08.2012	01:49	XCTD	on ground/max depth	82°7.97'N	30°0.04'E	3377
PS80/214-2	07.08.2012	01:57	XCTD	on ground/max depth	82°9.31'N	30°0.01'E	3397
PS80/215-1	07.08.2012	05:32	CTD/RO	on ground/max depth	82°29.71'N	30°0.18'E	3627
PS80/216-1	07.08.2012	07:17	SUIT	profile start	82°29.18'N	30°0.41'E	3617
PS80/216-1	07.08.2012	07:43	SUIT	profile end	82°30.39'N	29°53.82'E	3648
PS80/217-1	07.08.2012	10:16	ROV	profile start	82°39.37'N	30°1.35'E	3707
PS80/217-1	07.08.2012	10:17	ROV	profile end	82°39.38'N	30°1.41'E	3706
PS80/218-1	07.08.2012	15:32	CTD/RO	on ground/max depth	82°59.40'N	30°3.23'E	3850
PS80/219-1	08.08.2012	00:02	CTD/RO	on ground/max depth	83°28.59'N	29°55.76'E	3994
PS80/220-1	08.08.2012	09:28	CTD/RO	on ground/max depth	83°59.97'N	30°1.26'E	4016
PS80/221-1	08.08.2012	11:22	LANDER	in the water	84°0.03'N	30°4.44'E	4011
PS80/221-2	08.08.2012	14:03	LANDER	in the water	83°59.92'N	29°52.61'E	4016
PS80/221-3	08.08.2012	17:05	LANDER	in the water	83°59.75'N	29°44.46'E	4013
PS80/222-1	09.08.2012	00:26	AGT	profile start	84°2.26'N	30°9.72'E	4012
PS80/222-1	09.08.2012	01:03	AGT	profile end	84°2.28'N	30°11.27'E	4013
PS80/223-1	09.08.2012	04:12	SUIT	profile start	84°4.11'N	30°28.25'E	4019
PS80/223-1	09.08.2012	04:27	SUIT	profile end	84°3.75'N	30°32.75'E	4014
PS80/224-1	09.08.2012	08:08	ICE	information	84°3.03'N	31°6.83'E	4014
PS80/224-1	11.08.2012	12:23	ICE	on ground/max depth	84°2.03'N	31°6.57'E	4011
PS80/225-1	09.08.2012	10:35	TVMUC	on ground/max depth	84°2.839'N	31°11.558'E	4019
PS80/225-2	09.08.2012	13:51	TVMUC	on ground/max depth	84°1.998'N	31°14.678'E	4010
PS80/226-1	09.08.2012	17:08	MN	on ground/max depth	84°1.60'N	31°13.81'E	4011
PS80/227-1	09.08.2012	19:25	CTD/RO	on ground/max depth	84°1.46'N	31°13.66'E	4011
PS80/228-1	10.08.2012	07:27	OFOS	profile start	84°0.509'N	31°21.883'E	4010
PS80/228-1	10.08.2012	11:45	OFOS	profile end	83°59.873'N	31°25.564'E	4011
PS80/229-1	10.08.2012	14:00	MG	on ground/max depth	83°59.61'N	31°22.45'E	4009
PS80/229-2	10.08.2012	16:25	MG	on ground/max depth	83°59.83'N	31°19.07'E	4008
PS80/230-1	11.08.2012	06:12	CTD/RO	on ground/max depth	84°1.34'N	31°13.14'E	4011
PS80/231-1	11.08.2012	07:08	CTD/RO	on ground/max depth	84°1.48'N	31°12.60'E	4013
PS80/231-2	11.08.2012	08:40	CTD/RO	on ground/max depth	84°1.66'N	31°11.67'E	4056
PS80/232-1	11.08.2012	09:44	ISP	on ground/max depth	84°1.76'N	31°10.71'E	4012
PS80/233-1	11.08.2012	13:43	SUIT	profile start	84°2.52'N	31°16.55'E	4011
PS80/233-1	11.08.2012	14:08	SUIT	profile end	84°1.85'N	31°7.22'E	4012
PS80/234-1	12.08.2012	12:10	CTD/RO	on ground/max depth	83°59.40'N	39°28.42'E	3977
PS80/234-2	12.08.2012	13:01	XCTD	on ground/max depth	83°59.71'N	40°0.94'E	3966
PS80/234-3	12.08.2012	19:17	XCTD	on ground/max depth	83°58.58'N	46°46.51'E	3932
PS80/234-4	13.08.2012	03:30	XCTD	on ground/max depth	83°58.58'N	55°5.84'E	3780
PS80/235-1	13.08.2012	09:37	CTD/RO	on ground/max depth	83°55.36'N	60°39.31'E	3574
PS80/235-2	13.08.2012	12:48	XCTD	on ground/max depth	83°52.56'N	63°32.40'E	3437
PS80/235-3	13.08.2012	21:36	XCTD	on ground/max depth	83°54.38'N	71°56.26'E	4807
PS80/236-1	14.08.2012	05:27	LANDER	in the water	83°55.39'N	78°18.03'E	3470
PS80/236-2	14.08.2012	07:52	LANDER	in the water	83°55.20'N	78°34.24'E	3464
PS80/236-3	14.08.2012	10:26	LANDER	in the water	83°55.35'N	78°41.87'E	3466
PS80/237-1	14.08.2012	13:10	ICE	action	83°59.19'N	78°6.20'E	3485
PS80/237-1	16.08.2012	18:42	ICE	on ground/max depth	83°56.02'N	75°30.28'E	3425
PS80/238-1	14.08.2012	13:32	CTD/RO	on ground/max depth	83°59.10'N	78°5.39'E	3485
PS80/239-1	14.08.2012	15:17	OFOS	profile start	83°58.682'N	78°0.421'E	3477
PS80/239-1	14.08.2012	20:32	OFOS	profile end	83°58.115'N	77°33.415'E	3469
PS80/240-1	15.08.2012	07:50	TVMUC	on ground/max depth	83°56.84'N	76°52.32'E	4808
PS80/240-2	15.08.2012	10:38	TVMUC	on ground/max depth	83°57.03'N	76°48.31'E	3446

Station	Date	Time	Gear	Action	Position Lat	Position Lon	Water depth [m]
PS80/240-3	15.08.2012	13:00	MUC	on ground/max depth	83°56.61'N	76°46.73'E	3442
PS80/241-1	15.08.2012	14:50	MG	on ground/max depth	83°55.94'N	76°42.68'E	3432
PS80/242-1	16.08.2012	07:17	CTD/RO	on ground/max depth	83°54.32'N	76°0.37'E	3413
PS80/243-1	16.08.2012	09:30	MN	on ground/max depth	83°54.93'N	75°57.86'E	3420
PS80/244-1	16.08.2012	10:26	CTD/RO	on ground/max depth	83°55.10'N	75°58.26'E	3420
PS80/245-1	16.08.2012	11:25	CTD/RO	on ground/max depth	83°55.14'N	75°58.89'E	3420
PS80/246-1	16.08.2012	12:48	CTD/RO	on ground/max depth	83°54.96'N	75°59.31'E	3466
PS80/247-1	16.08.2012	13:56	ISP	on ground/max depth	83°54.69'N	75°57.92'E	3420
PS80/248-1	16.08.2012	18:48	SUIT	profile start	83°56.03'N	75°30.44'E	3423
PS80/248-1	16.08.2012	19:54	SUIT	profile end	83°57.02'N	75°30.90'E	3431
PS80/249-1	17.08.2012	02:05	AGT	profile start	83°58.04'N	77°40.88'E	3470
PS80/249-1	17.08.2012	02:35	AGT	profile end	83°58.09'N	77°47.67'E	3470
PS80/249-2	17.08.2012	17:28	AGT	profile start	83°58.32'N	77°40.95'E	3471
PS80/249-2	17.08.2012	17:43	AGT	profile end	83°58.24'N	77°37.89'E	3473
PS80/250-1	18.08.2012	08:13	CTD/RO	on ground/max depth	83°35.29'N	87°27.11'E	3508
PS80/250-2	18.08.2012	08:34	XCTD	on ground/max depth	83°35.33'N	87°36.27'E	3513
PS80/251-1	19.08.2012	10:18	LANDER	in the water	82°38.74'N	108°35.38'E	3557
PS80/251-2	19.08.2012	12:11	LANDER	in the water	82°38.97'N	108°45.43'E	3560
PS80/251-3	19.08.2012	14:01	LANDER	in the water	82°38.19'N	108°52.05'E	3605
PS80/252-1	19.08.2012	18:27	MOR	on deck	82°38.73'N	108°28.56'E	3555
PS80/253-1	20.08.2012	04:13	MOR	on deck	82°41.60'N	109°6.11'E	3568
PS80/254-1	20.08.2012	06:02	CTD/RO	on ground/max depth	82°42.52'N	109°8.62'E	3570
PS80/255-1	20.08.2012	08:48	ICE	action	82°40.24'N	109°35.37'E	3569
PS80/255-1	22.08.2012	11:49	ICE	on deck	83°8.54'N	109°55.76'E	3608
PS80/256-1	20.08.2012	09:07	CTD/RO	on ground/max depth	82°40.45'N	109°35.38'E	3571
PS80/257-1	20.08.2012	10:34	OFOS	profile start	82°41.161'N	109°35.866'E	3572
PS80/257-1	20.08.2012	14:30	OFOS	profile end	82°43.664'N	109°36.365'E	3575
PS80/258-1	20.08.2012	16:50	SUIT	profile start	82°44.44'N	109°38.65'E	3574
PS80/258-1	20.08.2012	17:15	SUIT	profile end	82°43.85'N	109°34.99'E	3547
PS80/259-1	20.08.2012	21:16	AGT	profile start	82°42.54'N	109°34.66'E	3575
PS80/259-1	20.08.2012	22:11	AGT	profile end	82°43.41'N	109°33.75'E	3576
PS80/260-1	21.08.2012	07:44	TVMUC	off ground	82°52.61'N	109°51.75'E	3589
PS80/260-2	21.08.2012	10:35	TVMUC	on ground/max depth	82°54.01'N	109°48.78'E	3591
PS80/260-3	21.08.2012	13:36	TVMUC	on ground/max depth	82°55.78'N	109°50.05'E	3595
PS80/261-1	21.08.2012	15:32	MN	on ground/max depth	82°56.65'N	109°53.16'E	3598
PS80/262-1	21.08.2012	18:42	MG	on ground/max depth	82°57.66'N	109°57.73'E	3598
PS80/262-2	21.08.2012	20:32	MG	on ground/max depth	82°58.57'N	109°55.12'E	3601
PS80/263-1	22.08.2012	05:14	CTD/RO	on ground/max depth	83°4.73'N	110°8.99'E	3606
PS80/264-1	22.08.2012	06:17	CTD/RO	on ground/max depth	83°4.89'N	110°8.49'E	3605
PS80/265-1	22.08.2012	07:21	CTD/RO	on ground/max depth	83°5.17'N	110°5.98'E	3605
PS80/266-1	22.08.2012	08:35	ISP	on ground/max depth	83°5.76'N	110°1.99'E	3606
PS80/267-1	23.08.2012	04:30	XCTD	in the water	82°40.75'N	109°27.11'E	3570
PS80/267-2	23.08.2012	08:23	CTD/RO	on ground/max depth	82°47.98'N	110°48.77'E	3584
PS80/267-3	23.08.2012	12:21	XCTD	in the water	82°51.34'N	111°56.49'E	3589
PS80/267-4	23.08.2012	13:26	XCTD	in the water	82°54.17'N	112°46.49'E	3609
PS80/268-1	23.08.2012	15:56	CTD/RO	on ground/max depth	82°56.90'N	113°43.64'E	3628
PS80/268-2	23.08.2012	18:24	XCTD	in the water	83°0.24'N	114°45.53'E	3282
PS80/268-3	23.08.2012	19:32	XCTD	in the water	83°4.87'N	115°46.44'E	4021
PS80/269-1	23.08.2012	22:15	CTD/RO	on ground/max depth	83°7.43'N	116°56.05'E	4410
PS80/269-2	24.08.2012	00:36	XCTD	in the water	83°9.15'N	117°34.19'E	3560
PS80/269-3	24.08.2012	01:18	XCTD	in the water	83°10.15'N	118°23.43'E	3636

Station	Date	Time	Gear	Action	Position Lat	Position Lon	Water depth [m]
PS80/270-1	24.08.2012	03:45	CTD/RO	on ground/max depth	83°12.38'N	119°26.66'E	3575
PS80/270-2	24.08.2012	05:51	XCTD	in the water	83°13.59'N	120°29.37'E	3846
PS80/270-3	24.08.2012	06:48	XCTD	in the water	83°15.85'N	121°29.08'E	3535
PS80/271-1	24.08.2012	09:09	CTD/RO	on ground/max depth	83°16.62'N	122°26.58'E	3831
PS80/271-2	24.08.2012	11:43	XCTD	in the water	83°17.27'N	123°24.22'E	4239
PS80/272-1	24.08.2012	14:16	MOR	action	83°16.22'N	124°51.01'E	4237
PS80/273-1	24.08.2012	17:04	MOR	on ground/max depth	83°17.08'N	124°31.01'E	4260
PS80/274-1	24.08.2012	21:25	MOR	action	83°22.13'N	125°13.79'E	4247
PS80/275-1	25.08.2012	00:43	CTD/RO	on ground/max depth	83°23.02'N	125°5.33'E	4244
PS80/276-1	25.08.2012	06:50	SUIT	profile start	83°4.38'N	129°7.76'E	4189
PS80/276-1	25.08.2012	07:28	SUIT	profile end	83°3.97'N	129°4.25'E	4189
PS80/277-1	25.08.2012	10:33	ICE	in the water	82°52.95'N	130°7.77'E	4161
PS80/277-1	26.08.2012	17:36	ICE	on deck	82°53.69'N	129°46.58'E	4173
PS80/277-2	25.08.2012	11:57	TVMUC	on ground/max depth	82°52.78'N	130°3.72'E	4166
PS80/277-3	25.08.2012	16:46	TVMUC	on ground/max depth	82°53.48'N	129°54.76'E	4166
PS80/277-4	25.08.2012	19:45	TVMUC	on ground/max depth	82°53.49'N	129°57.54'E	4166
PS80/278-1	25.08.2012	14:10	MG	on ground/max depth	82°52.96'N	129°57.29'E	4167
PS80/279-1	25.08.2012	21:55	MN	on ground/max depth	82°53.06'N	129°57.88'E	4166
PS80/280-1	26.08.2012	04:19	CTD/RO	on ground/max depth	82°53.38'N	129°48.68'E	4173
PS80/281-1	26.08.2012	05:36	CTD/RO	on ground/max depth	82°53.62'N	129°49.91'E	4223
PS80/282-1	26.08.2012	07:32	OFOS	profile start	82°53.632'N	129°52.933'E	4168
PS80/282-1	26.08.2012	12:00	OFOS	profile end	82°52.774'N	129°51.508'E	4172
PS80/283-1	26.08.2012	14:15	ISP	on ground/max depth	82°52.94'N	129°46.84'E	4173
PS80/284-1	26.08.2012	17:18	CTD/RO	on ground/max depth	82°53.65'N	129°46.15'E	4173
PS80/285-1	26.08.2012	18:15	SUIT	profile start	82°53.65'N	129°49.38'E	4170
PS80/285-1	26.08.2012	18:40	SUIT	profile end	82°53.36'N	129°46.24'E	4172
PS80/286-1	26.08.2012	22:20	AGT	profile start	82°47.43'N	129°52.66'E	4158
PS80/286-1	26.08.2012	23:33	AGT	profile end	82°46.68'N	129°50.80'E	4159
PS80/287-1	27.08.2012	03:23	XCTD	in the water	82°38.07'N	129°13.86'E	4136
PS80/287-2	27.08.2012	06:09	XCTD	in the water	82°22.49'N	127°57.17'E	4099
PS80/287-3	27.08.2012	09:38	CTD/RO	on ground/max depth	82°9.94'N	126°58.18'E	4820
PS80/287-4	27.08.2012	13:21	XCTD	in the water	81°48.08'N	126°38.48'E	4043
PS80/287-5	27.08.2012	15:04	XCTD	action	81°31.16'N	126°36.68'E	4010
PS80/287-6	27.08.2012	17:47	XCTD	in the water	81°13.10'N	126°23.81'E	3943
PS80/288-1	27.08.2012	22:23	CTD/RO	on ground/max depth	80°51.30'N	126°33.63'E	3784
PS80/288-2	28.08.2012	01:26	XCTD	in the water	80°39.29'N	126°56.37'E	3786
PS80/288-3	28.08.2012	03:39	XCTD	in the water	80°25.86'N	127°14.22'E	3672
PS80/288-4	28.08.2012	05:22	XCTD	in the water	80°12.63'N	128°1.65'E	3599
PS80/289-1	28.08.2012	08:01	CTD/RO	on ground/max depth	80°0.26'N	128°29.03'E	3549
PS80/289-2	28.08.2012	10:54	XCTD	in the water	79°49.31'N	129°47.27'E	3471
PS80/290-1	28.08.2012	12:04	LANDER	in the water	79°42.16'N	130°35.34'E	3420
PS80/290-2	28.08.2012	13:50	LANDER	in the water	79°40.87'N	130°35.58'E	3401
PS80/290-3	28.08.2012	15:36	LANDER	in the water	79°39.86'N	130°35.09'E	3398
PS80/291-1	28.08.2012	18:41	CTD/RO	on ground/max depth	79°39.01'N	130°34.77'E	3389
PS80/291-2	29.08.2012	01:38	XCTD	in the water	79°32.93'N	130°47.43'E	3324
PS80/291-3	29.08.2012	02:15	XCTD	in the water	79°26.54'N	131°0.76'E	3262
PS80/292-1	28.08.2012	21:22	TVMUC	on ground/max depth	79°38.989'N	130°35.848'E	3387
PS80/292-2	28.08.2012	23:54	TVMUC	on ground/max depth	79°39.033'N	130°35.889'E	3390
PS80/293-1	29.08.2012	04:07	CTD/RO	on ground/max depth	79°20.92'N	131°12.43'E	3229
PS80/293-2	29.08.2012	05:55	XCTD	in the water	79°14.36'N	131°24.96'E	3200
PS80/293-3	29.08.2012	06:31	XCTD	in the water	79°8.08'N	131°36.95'E	3116

Station	Date	Time	Gear	Action	Position Lat	Position Lon	Water depth [m]
PS80/294-1	29.08.2012	08:21	CTD/RO	on ground/max depth	79°3.01'N	131°46.78'E	3079
PS80/294-2	29.08.2012	10:08	XCTD	in the water	78°56.93'N	131°57.57'E	3025
PS80/294-3	29.08.2012	10:43	XCTD	in the water	78°50.82'N	132°8.58'E	3004
PS80/295-1	29.08.2012	12:28	CTD/RO	on ground/max depth	78°44.73'N	132°19.54'E	2968
PS80/295-2	29.08.2012	14:13	XCTD	in the water	78°38.50'N	132°34.61'E	2838
PS80/295-3	29.08.2012	14:49	XCTD	in the water	78°32.71'N	132°48.65'E	2632
PS80/296-1	29.08.2012	16:32	TVMUC	on ground/max depth	78°23.317'N	133°12.09'E	1986
PS80/297-1	29.08.2012	19:12	CTD/RO	on ground/max depth	78°22.37'N	133°11.77'E	1921
PS80/297-2	29.08.2012	20:56	XCTD	in the water	78°15.10'N	133°15.53'E	1305
PS80/298-1	29.08.2012	22:10	CTD/RO	on ground/max depth	78°8.07'N	133°20.51'E	791
PS80/299-1	29.08.2012	23:16	TVMUC	on ground/max depth	78°8.169'N	133°19.967'E	787
PS80/300-1	30.08.2012	05:09	MOR	action	77°58.55'N	136°57.48'E	68
PS80/301-1	30.08.2012	12:12	CTD/RO	on ground/max depth	77°58.52'N	136°58.24'E	69
PS80/301-2	30.08.2012	15:30	XCTD	in the water	77°45.06'N	135°8.57'E	67
PS80/301-3	30.08.2012	17:50	XCTD	in the water	77°32.45'N	133°28.15'E	63
PS80/301-4	30.08.2012	20:16	XCTD	in the water	77°19.60'N	131°47.55'E	69
PS80/301-5	30.08.2012	22:42	XCTD	in the water	77°6.72'N	130°8.34'E	63
PS80/301-6	31.08.2012	01:02	XCTD	in the water	76°54.17'N	128°33.32'E	78
PS80/301-7	31.08.2012	03:20	XCTD	in the water	76°41.68'N	127°0.13'E	71
PS80/302-1	30.08.2012	12:52	TVMUC	on ground/max depth	77°58.279'N	136°58.061'E	68
PS80/303-1	31.08.2012	05:10	MOR	action	76°34.18'N	126°4.73'E	58
PS80/304-1	31.08.2012	08:53	MOR	action	76°47.98'N	125°59.81'E	80
PS80/305-1	31.08.2012	11:09	CTD/RO	on ground/max depth	76°48.04'N	126°0.68'E	79
PS80/305-2	31.08.2012	14:07	XCTD	in the water	77°7.64'N	124°26.13'E	292
PS80/305-3	31.08.2012	16:29	XCTD	in the water	77°13.01'N	122°46.18'E	114
PS80/305-4	31.08.2012	18:50	XCTD	in the water	77°19.85'N	121°4.56'E	398
PS80/305-5	31.08.2012	21:27	XCTD	in the water	77°23.78'N	119°20.43'E	638
PS80/305-6	01.09.2012	00:08	XCTD	in the water	77°29.07'N	117°35.74'E	540
PS80/305-7	01.09.2012	03:15	XCTD	in the water	77°23.53'N	115°48.81'E	78
PS80/306-1	31.08.2012	11:23	HS_PS	profile start	76°48.40'N	125°57.85'E	81
PS80/306-1	01.09.2012	05:04	HS_PS	profile end	77°10.22'N	114°55.08'E	71
PS80/307-1	01.09.2012	06:10	MOR	information	77°10.23'N	114°55.14'E	71
PS80/308-1	01.09.2012	10:00	CTD/RO	on ground/max depth	77°10.29'N	114°55.20'E	70
PS80/309-1	01.09.2012	10:42	TVMUC	on ground/max depth	77°10.15'N	114°54.96'E	70
PS80/310-1	01.09.2012	15:51	TVMUC	on ground/max depth	77°15.118'N	118°33.271'E	24
PS80/311-1	01.09.2012	17:34	CTD/RO	on ground/max depth	77°23.81'N	118°11.75'E	530
PS80/311-2	01.09.2012	20:04	XCTD	in the water	77°30.33'N	118°20.35'E	982
PS80/311-3	01.09.2012	20:47	XCTD	in the water	77°37.60'N	118°30.22'E	1362
PS80/312-1	01.09.2012	19:05	TVMUC	off ground	77°23.796'N	118°0.00'E	529
PS80/313-1	01.09.2012	22:11	TVMUC	on ground/max depth	77°40.805'N	118°0.00'E	1489
PS80/314-1	02.09.2012	00:05	CTD/RO	on ground/max depth	77°42.95'N	118°18.99'E	1508
PS80/314-2	02.09.2012	01:32	XCTD	in the water	77°49.92'N	118°22.16'E	1682
PS80/314-3	02.09.2012	02:08	XCTD	in the water	77°56.38'N	118°24.85'E	1807
PS80/315-1	02.09.2012	03:33	CTD/RO	on ground/max depth	78°1.94'N	118°27.29'E	1895
PS80/315-2	02.09.2012	05:02	XCTD	in the water	78°8.04'N	118°29.88'E	2006
PS80/315-2	02.09.2012	05:07	XCTD	in the water	78°8.93'N	118°30.29'E	2015
PS80/315-3	02.09.2012	05:41	XCTD	in the water	78°15.03'N	118°32.95'E	2133
PS80/316-1	02.09.2012	07:14	CTD/RO	on ground/max depth	78°21.00'N	118°36.00'E	2226
PS80/316-2	02.09.2012	08:49	XCTD	in the water	78°27.78'N	118°38.77'E	2342
PS80/316-3	02.09.2012	09:23	XCTD	in the water	78°33.83'N	118°41.61'E	2466
PS80/317-1	02.09.2012	11:01	CTD/RO	on ground/max depth	78°39.98'N	118°44.58'E	2570

Station	Date	Time	Gear	Action	Position Lat	Position Lon	Water depth [m]
PS80/317-2	02.09.2012	14:33	XCTD	in the water	78°45.96'N	118°56.83'E	2684
PS80/317-3	02.09.2012	15:09	XCTD	in the water	78°51.91'N	119°9.26'E	2768
PS80/317-4	02.09.2012	15:46	XCTD	in the water	78°58.04'N	119°22.24'E	2851
PS80/317-5	02.09.2012	16:22	XCTD	in the water	79°3.95'N	119°34.83'E	2936
PS80/318-1	02.09.2012	13:12	TVMUC	on ground/max depth	78°40.034'N	118°44.39'E	2570
PS80/319-1	02.09.2012	18:11	CTD/RO	on ground/max depth	79°9.75'N	119°47.08'E	3006
PS80/320-1	02.09.2012	20:39	TVMUC	on ground/max depth	79°9.696'N	119°47.258'E	3003
PS80/321-1	04.09.2012	07:22	SUIT	profile start	81°43.18'N	130°2.09'E	4012
PS80/321-1	04.09.2012	07:48	SUIT	profile end	81°43.80'N	130°5.67'E	4015
PS80/322-1	04.09.2012	08:38	BUOY	on ground/max depth	81°45.79'N	130°0.08'E	4020
PS80/323-1	04.09.2012	11:00	ICE	in the water	81°55.53'N	131°7.72'E	4031
PS80/323-1	05.09.2012	15:00	ICE	on ground/max depth	81°53.08'N	130°53.25'E	4032
PS80/324-1	04.09.2012	11:24	CTD/RO	on ground/max depth	81°55.50'N	131°6.34'E	4040
PS80/325-1	04.09.2012	14:50	ISP	on ground/max depth	81°55.61'N	130°56.43'E	4043
PS80/326-1	04.09.2012	16:15	MG	on ground/max depth	81°55.62'N	130°55.00'E	4038
PS80/327-1	04.09.2012	18:59	OFOS	profile start	81°55.066'N	130°55.49'E	4042
PS80/327-1	04.09.2012	23:09	OFOS	profile end	81°53.363'N	130°53.361'E	4033
PS80/328-1	05.09.2012	06:59	MN	on ground/max depth	81°53.31'N	130°49.14'E	4035
PS80/329-1	05.09.2012	10:44	CTD/RO	on ground/max depth	81°52.55'N	130°52.65'E	4032
PS80/330-1	05.09.2012	13:03	MUC	on ground/max depth	81°52.578'N	130°51.528'E	4034
PS80/331-1	05.09.2012	16:05	SUIT	profile start	81°54.25'N	130°51.35'E	4037
PS80/331-1	05.09.2012	16:30	SUIT	profile end	81°53.89'N	130°46.34'E	4036
PS80/332-1	05.09.2012	19:53	AGT	profile start	81°54.56'N	130°52.60'E	4038
PS80/332-1	05.09.2012	20:09	AGT	profile end	81°54.37'N	130°50.59'E	4039
PS80/333-1	06.09.2012	06:13	SUIT	profile start	82°59.46'N	127°5.47'E	4187
PS80/333-1	06.09.2012	06:39	SUIT	profile end	83°0.20'N	127°8.36'E	4187
PS80/333-2	06.09.2012	07:18	CTD/RO	on ground/max depth	83°0.17'N	127°10.77'E	4190
PS80/333-3	06.09.2012	19:09	XCTD	in the water	84°31.81'N	124°21.05'E	4331
PS80/334-1	07.09.2012	00:15	LANDER	in the water	85°9.79'N	123°0.02'E	4356
PS80/334-2	07.09.2012	02:16	LANDER	in the water	85°8.94'N	123°10.16'E	4354
PS80/334-3	07.09.2012	04:05	LANDER	in the water	85°7.92'N	123°9.16'E	4356
PS80/335-1	07.09.2012	07:47	ICE	on ground/max depth	85°6.11'N	122°14.72'E	4355
PS80/335-1	09.09.2012	15:12	ICE	on deck	85°13.56'N	123°44.31'E	4354
PS80/336-1	07.09.2012	09:44	CTD/RO	on ground/max depth	85°5.66'N	122°15.97'E	4355
PS80/337-1	07.09.2012	12:25	MN	on ground/max depth	85°5.56'N	122°16.65'E	4356
PS80/338-1	07.09.2012	14:51	TVMUC	on ground/max depth	85°5.636'N	122°20.199'E	4357
PS80/338-2	07.09.2012	18:22	TVMUC	on ground/max depth	85°5.154'N	122°29.434'E	4354
PS80/339-1	08.09.2012	08:49	MG	on ground/max depth	85°3.44'N	122°44.17'E	4352
PS80/340-1	08.09.2012	11:43	OFOS	profile start	85°3.519'N	122°41.60'E	4351
PS80/340-1	08.09.2012	19:35	OFOS	profile end	85°5.126'N	122°50.085'E	4354
PS80/341-1	09.09.2012	08:06	CTD/RO	on ground/max depth	85°9.54'N	123°21.54'E	4353
PS80/342-1	09.09.2012	09:08	CTD/RO	on ground/max depth	85°9.89'N	123°25.87'E	4354
PS80/343-1	09.09.2012	10:22	CTD/RO	on ground/max depth	85°10.38'N	123°28.85'E	4353
PS80/344-1	09.09.2012	11:31	ISP	on ground/max depth	85°10.97'N	123°31.24'E	4353
PS80/345-1	09.09.2012	16:29	SUIT	profile start	85°15.25'N	123°53.21'E	4354
PS80/345-1	09.09.2012	16:59	SUIT	profile end	85°14.78'N	124°4.30'E	4353
PS80/346-1	09.09.2012	20:55	AGT	profile start	85°4.35'N	122°42.42'E	4353
PS80/346-1	09.09.2012	21:10	AGT	profile end	85°4.13'N	122°41.49'E	4354
PS80/347-1	17.09.2012	16:27	HS_PS	profile start	86°12.70'N	60°17.22'E	4014
PS80/347-1	17.09.2012	19:57	HS_PS	profile end	86°36.26'N	61°50.13'E	3099
PS80/348-1	17.09.2012	17:15	XCTD	in the water	86°18.38'N	60°7.91'E	3024

Station	Date	Time	Gear	Action	Position Lat	Position Lon	Water depth [m]
PS80/348-2	17.09.2012	20:16	XCTD	in the water	86°38.39'N	61°49.98'E	2571
PS80/348-3	17.09.2012	23:36	XCTD	in the water	87°0.07'N	61°38.17'E	2080
PS80/348-4	18.09.2012	02:57	XCTD	in the water	87°20.22'N	60°28.72'E	1078
PS80/348-5	18.09.2012	06:20	XCTD	in the water	87°41.86'N	60°49.04'E	3999
PS80/349-1	18.09.2012	09:38	ICE	action	87°56.01'N	61°13.04'E	4380
PS80/349-1	19.09.2012	14:20	ICE	on ground/max depth	87°55.47'N	61°7.45'E	4384
PS80/350-1	18.09.2012	11:25	TVMUC	on ground/max depth	87°56.003'N	61°10.175'E	4381
PS80/350-2	18.09.2012	14:51	TVMUC	on ground/max depth	87°55.92'N	61°2.572'E	4384
PS80/350-3	18.09.2012	18:37	TVMUC	on ground/max depth	87°55.972'N	60°59.23'E	4382
PS80/351-1	18.09.2012	20:59	MN	on ground/max depth	87°55.94'N	61°0.11'E	4382
PS80/352-1	18.09.2012	22:30	ISP	on ground/max depth	87°55.81'N	61°0.95'E	4383
PS80/353-1	19.09.2012	01:52	CTD/RO	on ground/max depth	87°55.52'N	60°58.07'E	4384
PS80/354-1	19.09.2012	04:12	CTD/RO	on ground/max depth	87°55.49'N	60°56.60'E	4382
PS80/355-1	19.09.2012	06:48	MG	on ground/max depth	87°55.61'N	61°0.73'E	4381
PS80/356-1	19.09.2012	09:31	OFOS	profile start	87°55.561'N	61°7.584'E	4384
PS80/356-1	19.09.2012	12:31	OFOS	profile end	87°55.439'N	61°8.955'E	4383
PS80/357-1	19.09.2012	14:11	CTD/RO	on ground/max depth	87°55.47'N	61°7.50'E	4382
PS80/358-1	19.09.2012	15:55	SUIT	profile start	87°52.41'N	59°37.09'E	4384
PS80/358-1	19.09.2012	16:20	SUIT	profile end	87°53.42'N	59°46.31'E	4423
PS80/359-1	19.09.2012	20:05	AGT	profile start	87°53.53'N	59°23.32'E	4380
PS80/359-1	19.09.2012	20:20	AGT	profile end	87°53.77'N	59°20.81'E	4380
PS80/360-1	22.09.2012	05:24	ICE	action	88°49.66'N	58°51.81'E	4374
PS80/360-1	23.09.2012	22:10	ICE	on ground/max depth	88°44.53'N	55°6.16'E	4375
PS80/361-1	22.09.2012	07:45	TVMUC	on ground/max depth	88°49.605'N	58°37.651'E	4373
PS80/362-1	22.09.2012	11:18	TVMUC	on ground/max depth	88°49.22'N	58°13.59'E	4374
PS80/363-1	22.09.2012	14:31	TVMUC	on ground/max depth	88°48.872'N	57°44.301'E	4375
PS80/364-1	22.09.2012	17:31	CTD/RO	on ground/max depth	88°48.54'N	57°15.27'E	4377
PS80/365-1	22.09.2012	20:25	CTD/RO	on ground/max depth	88°48.18'N	57°2.95'E	4375
PS80/366-1	22.09.2012	21:15	ISP	on ground/max depth	88°48.05'N	56°59.77'E	4376
PS80/367-1	23.09.2012	01:30	MN	on ground/max depth	88°47.39'N	56°33.31'E	4376
PS80/368-1	23.09.2012	03:14	MG	on ground/max depth	88°47.19'N	56°22.32'E	4374
PS80/369-1	23.09.2012	06:08	OFOS	profile start	88°46.839'N	56°8.376'E	4373
PS80/369-1	23.09.2012	08:45	OFOS	profile end	88°46.493'N	56°1.457'E	4375
PS80/370-1	23.09.2012	10:25	CTD/RO	on ground/max depth	88°46.24'N	55°55.61'E	4377
PS80/371-1	23.09.2012	13:19	LANDER	on ground/max depth	88°45.77'N	55°40.39'E	4369
PS80/372-1	24.09.2012	13:55	CTD/RO	on ground/max depth	88°24.47'N	52°19.79'E	4384
PS80/373-1	25.09.2012	00:31	CTD/RO	on ground/max depth	87°47.98'N	49°59.91'E	4381
PS80/373-2	25.09.2012	03:04	XCTD	in the water	87°39.11'N	49°58.69'E	3737
PS80/374-1	25.09.2012	04:24	SUIT	profile start	87°35.82'N	50°2.77'E	4255
PS80/374-1	25.09.2012	04:28	SUIT	profile end	87°35.93'N	50°3.97'E	4364
PS80/375-1	25.09.2012	08:19	CTD/RO	on ground/max depth	87°30.22'N	52°0.66'E	4177
PS80/376-1	25.09.2012	12:11	SUIT	profile start	87°20.42'N	52°36.07'E	3481
PS80/376-1	25.09.2012	12:18	SUIT	profile end	87°20.25'N	52°33.46'E	3450
PS80/377-1	25.09.2012	15:25	CTD/RO	on ground/max depth	87°12.64'N	51°50.58'E	3655
PS80/377-2	25.09.2012	18:33	XCTD	in the water	87°2.23'N	51°37.18'E	4844
PS80/378-1	25.09.2012	21:43	CTD/RO	on ground/max depth	86°53.00'N	52°17.22'E	4939
PS80/378-2	26.09.2012	01:14	XCTD	in the water	86°45.51'N	52°14.68'E	4432
PS80/379-1	26.09.2012	04:26	CTD/RO	on ground/max depth	86°35.87'N	52°39.07'E	4842
PS80/379-2	26.09.2012	07:34	XCTD	in the water	86°26.96'N	52°11.31'E	3762
PS80/380-1	26.09.2012	10:56	CTD/RO	on ground/max depth	86°19.10'N	52°11.51'E	3589
PS80/381-1	26.09.2012	16:50	CTD/RO	on ground/max depth	86°1.45'N	52°33.02'E	3933

Station	Date	Time	Gear	Action	Position Lat	Position Lon	Water depth [m]
PS80/382-1	27.09.2012	00:47	CTD/RO	on ground/max depth	85°24.62'N	52°16.31'E	3928
PS80/383-1	27.09.2012	08:25	CTD/RO	on ground/max depth	84°48.13'N	52°6.29'E	3910
PS80/384-1	28.09.2012	12:23	ICE	in the water	84°22.49'N	17°27.22'E	3513
PS80/384-1	29.09.2012	15:10	ICE	on deck	84°20.79'N	17°48.96'E	4025
PS80/385-1	28.09.2012	13:31	TVMUC	on ground/max depth	84°22.37'N	17°28.80'E	3617
PS80/386-1	28.09.2012	15:48	MN	on ground/max depth	84°22.17'N	17°30.67'E	3786
PS80/387-1	28.09.2012	18:07	CTD/RO	on ground/max depth	84°22.07'N	17°31.51'E	3897
PS80/388-1	28.09.2012	20:04	BONGO	on ground/max depth	84°22.03'N	17°33.33'E	3998
PS80/389-1	28.09.2012	20:55	BONGO	on ground/max depth	84°21.98'N	17°34.63'E	4020
PS80/390-1	28.09.2012	21:40	CTD/RO	on ground/max depth	84°21.91'N	17°35.87'E	4020
PS80/391-1	28.09.2012	22:52	ISP	on ground/max depth	84°21.77'N	17°37.74'E	4023
PS80/392-1	29.09.2012	02:48	OFOS	profile start	84°21.196'N	17°42.419'E	4049
PS80/392-1	29.09.2012	04:02	OFOS	profile end	84°21.097'N	17°42.817'E	4067
PS80/393-1	29.09.2012	06:18	MG	on ground/max depth	84°21.07'N	17°42.97'E	4024
PS80/394-1	29.09.2012	08:45	TVMUC	off ground	84°21.00'N	17°44.17'E	4023
PS80/394-2	29.09.2012	13:21	TVMUC	on ground/max depth	84°20.78'N	17°48.16'E	4024
PS80/395-1	29.09.2012	11:08	MG	on ground/max depth	84°20.88'N	17°46.32'E	4023
PS80/396-1	29.09.2012	14:59	CTD/RO	on ground/max depth	84°20.79'N	17°48.92'E	4025
PS80/397-1	29.09.2012	18:41	SUIT	profile start	84°10.05'N	17°55.75'E	4026
PS80/397-1	29.09.2012	19:01	SUIT	profile end	84°9.93'N	17°50.40'E	4028
PS80/397-2	29.09.2012	19:09	XCTD	in the water	84°10.01'N	17°50.67'E	4027

A.5 ADDITIONAL FIGURES AND TABLES

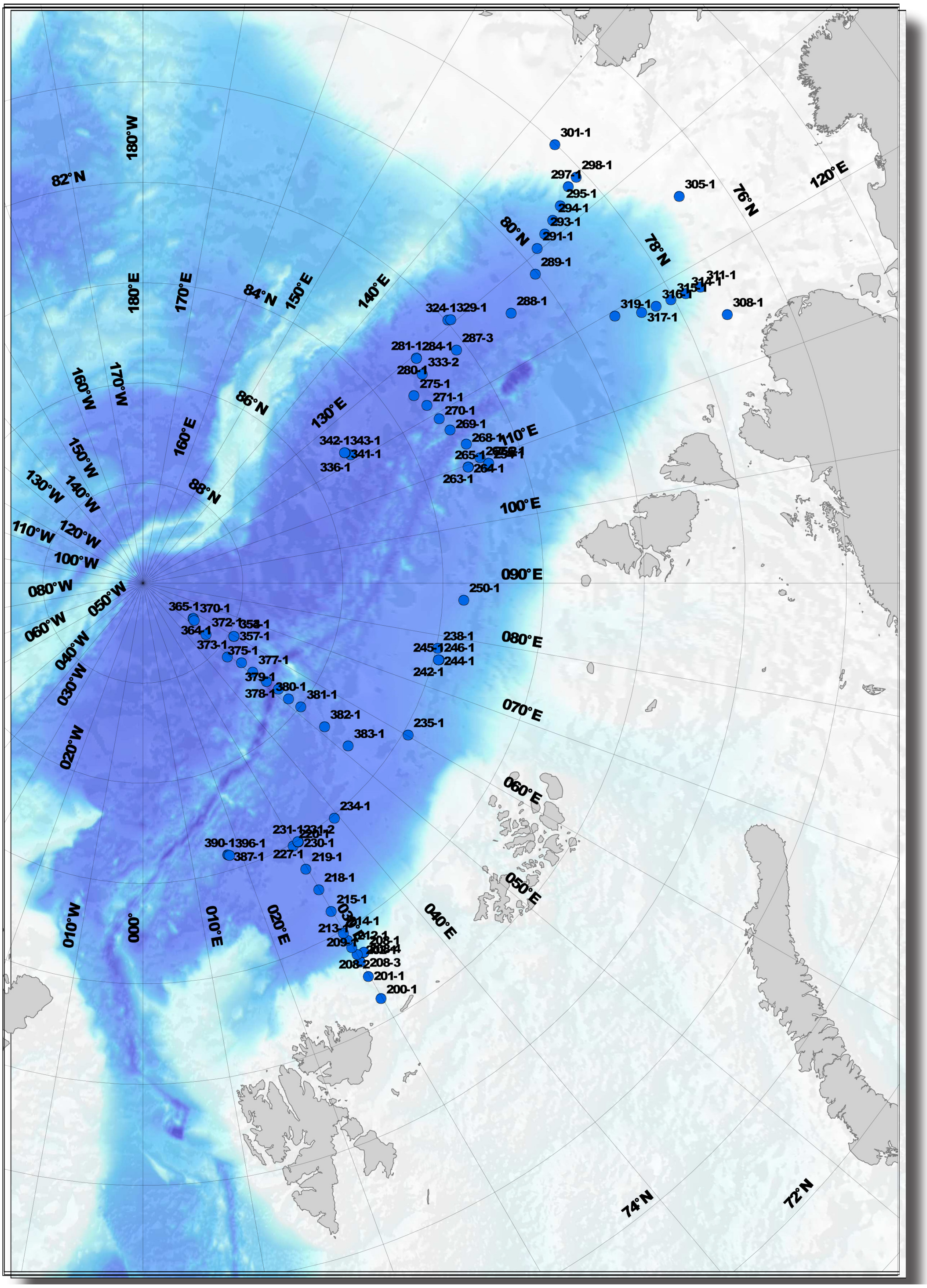

Fig. A1: *CTD stations during ARK-XXVII/3*

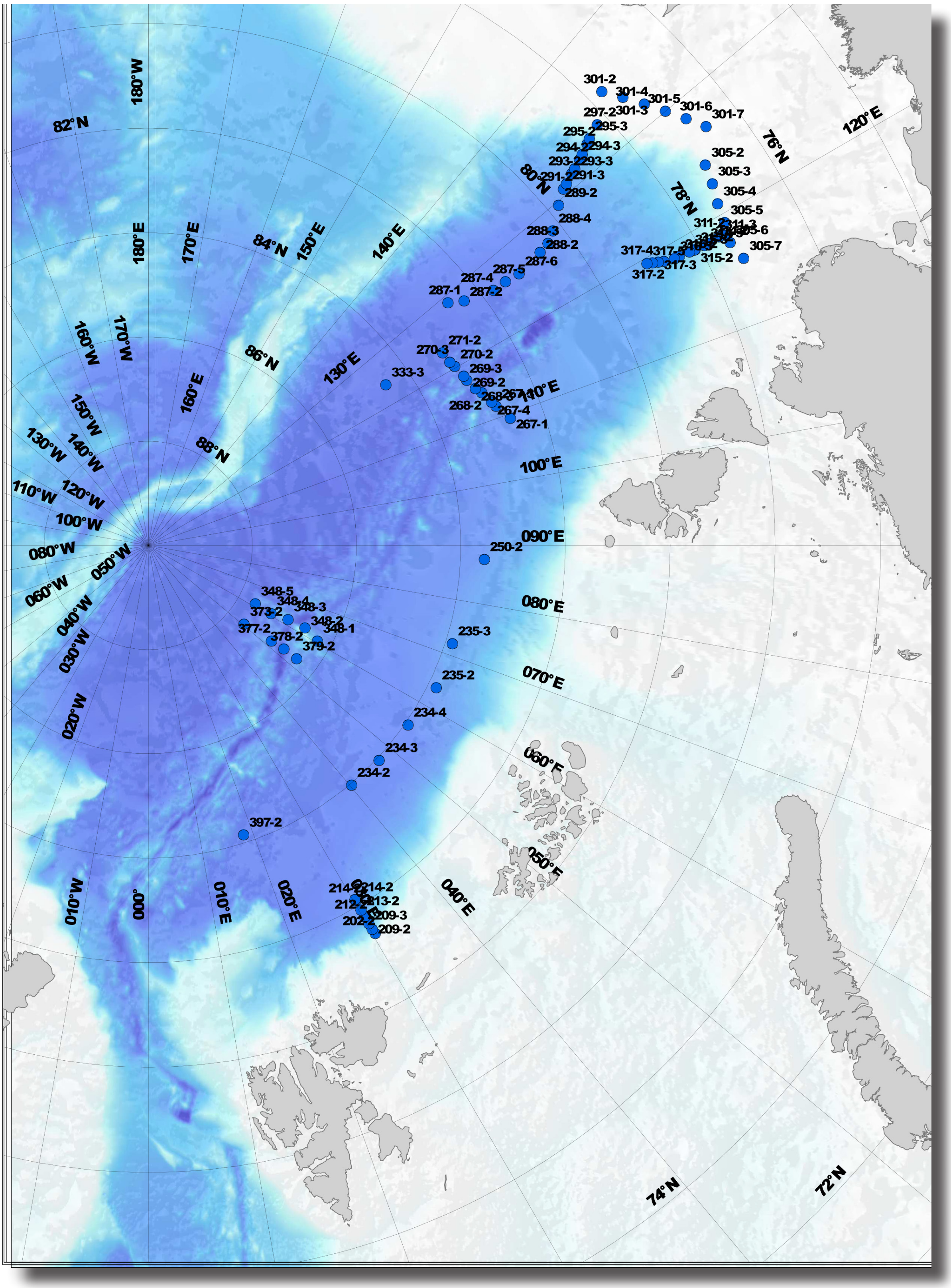

Fig. A2: *XCTD stations from ship and by helicopter during ARK-XXVII/3*

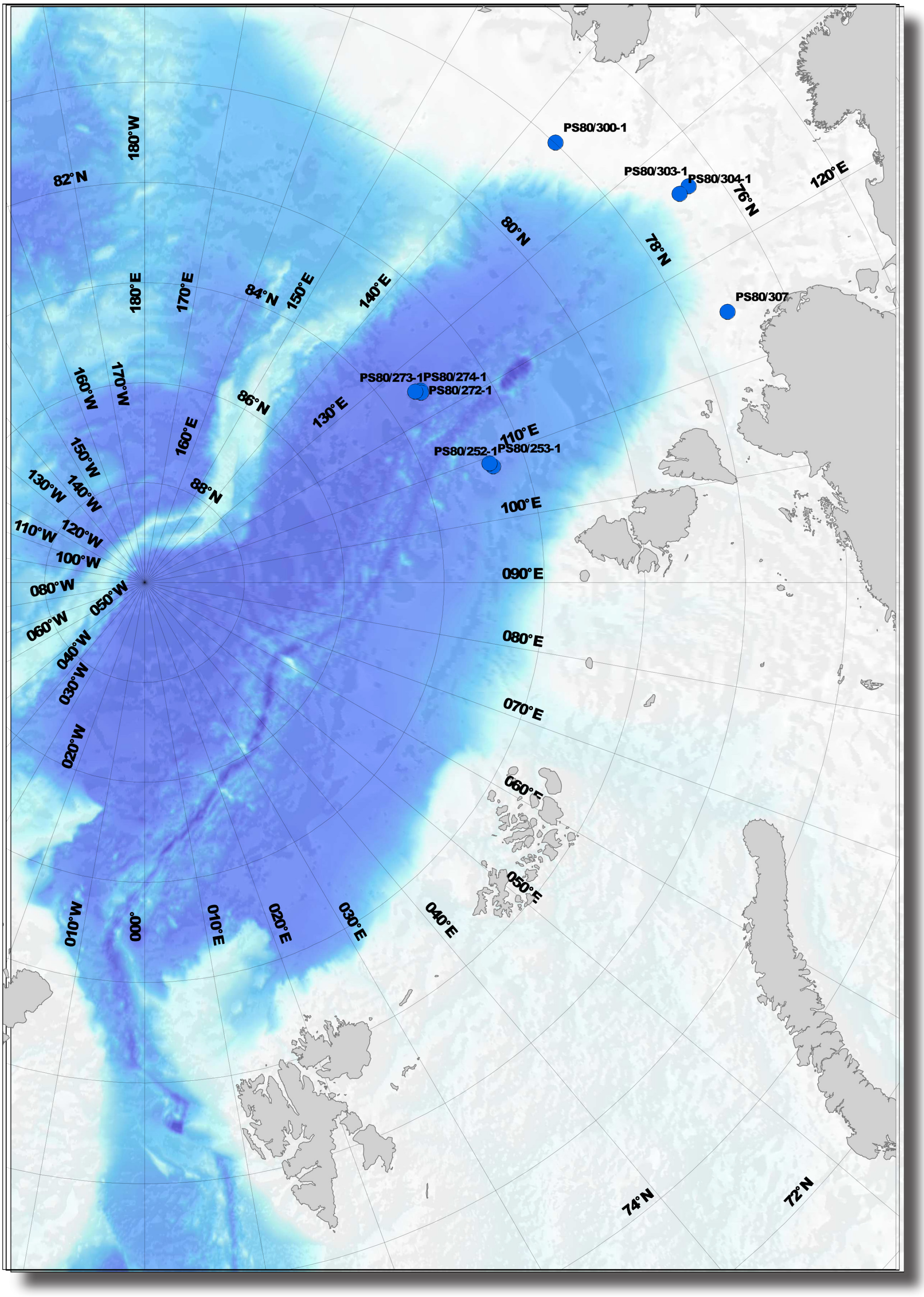

Fig. A3: *Moorings recovered and deployed during ARK-XXVII/3*

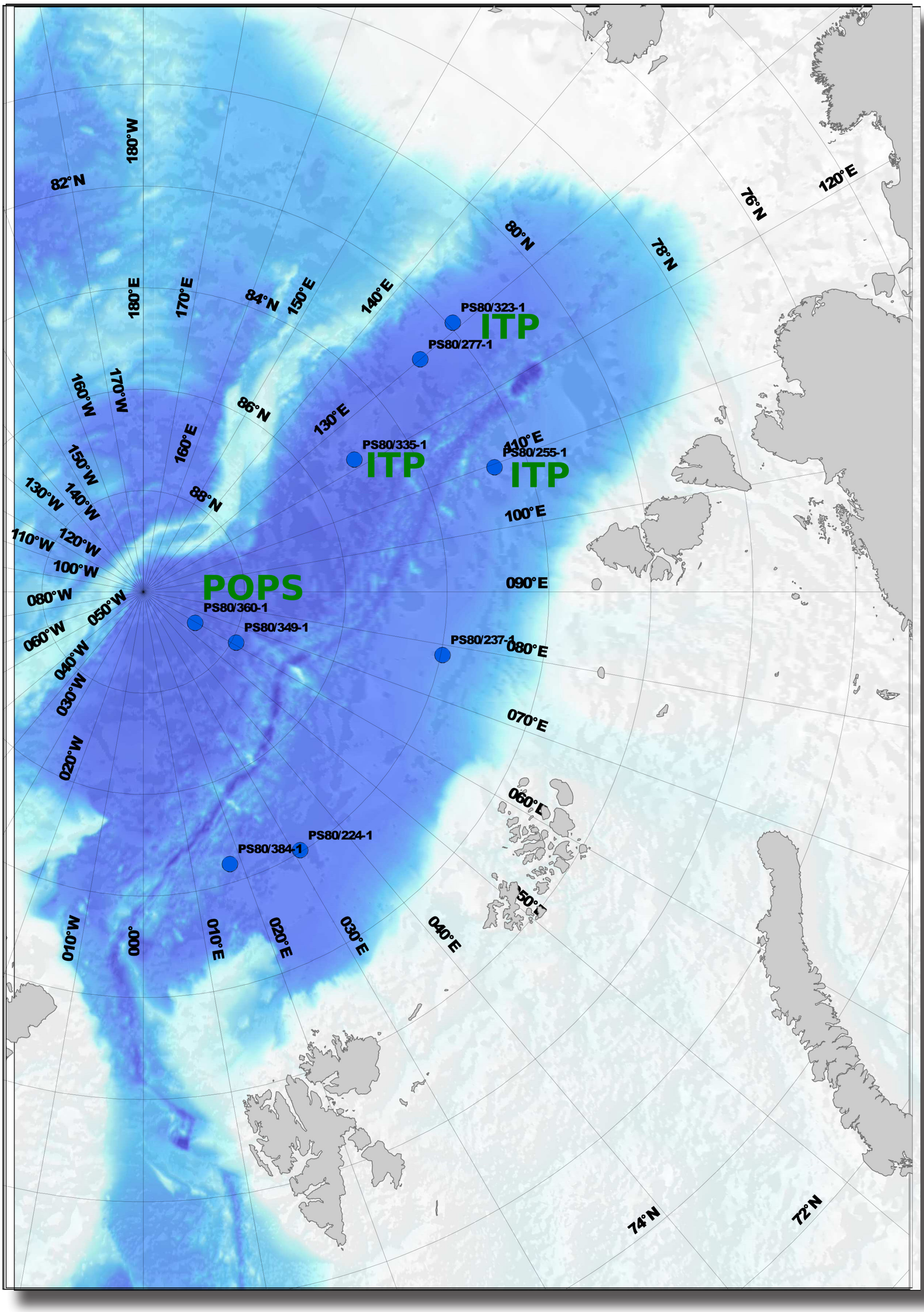

Fig. A4: *Ocean buoy systems deployed on 4 ice floes during ARK-XXVII/3*

Event	Latitude	Longitude	Label	Device	Date	Comment 1	Comment 2
PS80/224-1	84.0505	31.11383	PS80/224_ADCP	Acoustic Doppler Current Profiler from ice floe	8/11/2012	BioGeo ADCP	Albedo Larm sites
PS80/224-1	84.0505	31.11383	PS80/224_ALB-1	Surface albedo measurements	8/10/2012	Albedo1	Albedo ROV transect
PS80/224-1	84.0505	31.11383	PS80/224_ALB-2	Surface albedo measurements	8/10/2012	Albedo2	Albedo ROV transect
PS80/224-1	84.0505	31.11383	PS80/224_ALB-3	Surface albedo measurements	8/10/2012	Albedo3	Albedo ROV transect
PS80/224-1	84.0505	31.11383	PS80/224_ALB-4	Surface albedo measurements	8/10/2012	Albedo4	Albedo ROV transect
PS80/224-1	84.0505	31.11383	PS80/224_ALB-5	Surface albedo measurements	8/10/2012	Albedo5	Albedo ROV transect
PS80/224-1	84.0505	31.11383	PS80/224_ALB-R	Surface albedo measurements	8/11/2012	Albedo ROV transect	Albedo ROV transect
PS80/224-1	84.0505	31.11383	PS80/224_AWS	Automatic Weather Station	8/6/2012	AWS	Albedo ROV transect
PS80/224-1	84.0505	31.11383	PS80/224_BUOY-IMB-1	Buoy, Ice Mass Balance		IMB1-Biogeo	Albedo ROV transect
PS80/224-1	84.0505	31.11383	PS80/224_BUOY-IMB-2	Buoy, Ice Mass Balance		IMB2-Biogeo	Albedo selected surfaces 1
PS80/224-1	84.0505	31.11383	PS80/224_BUOY-SVP-1	Buoy, Surface Velocity Profiler	8/20/2012	Camera / SVP1	Albedo selected surfaces 1
PS80/224-1	84.0505	31.11383	PS80/224_BUOY-SVP-2	Buoy, Surface Velocity Profiler	8/22/2012	SVP2 Ridge	Albedo selected surfaces 1
PS80/224-1	84.0505	31.11383	PS80/224_CORE-ARC-1	Sea Ice Corer	8/9/2012	Core length [m]: 1.18	Albedo selected surfaces 1
PS80/224-1	84.0505	31.11383	PS80/224_CORE-BAT-1	Sea Ice Corer	8/9/2012	Core length [m]: 1.13	Albedo selected surfaces 2
PS80/224-1	84.0505	31.11383	PS80/224_CORE-BAT-2	Sea Ice Corer	8/9/2012	Core length [m]: 1.14	Albedo time sequence
PS80/224-1	84.0505	31.11383	PS80/224_CORE-BAT-3	Sea Ice Corer	8/9/2012	Core length [m]: 1.22	Albedo1
PS80/224-1	84.0505	31.11383	PS80/224_CORE-BGC-1	Sea Ice Corer	8/9/2012	Core length [m]: 1.15	Albedo1
PS80/224-1	84.0505	31.11383	PS80/224_CORE-BIO-1	Sea Ice Corer	8/9/2012	Core length [m]: 1.25	Albedo1

Event	Latitude	Longitude	Label	Device	Date	Comment 1	Comment 2
PS80/224-1	84.0505	31.11383	PS80/224_CORE-BIO-2	Sea Ice Corer	8/9/2012	Core length [m]: 1.2	Albedo1
PS80/224-1	84.0505	31.11383	PS80/224_CORE-DEN-1	Sea Ice Corer	8/9/2012	Core length [m]: 1.14	Albedo1
PS80/224-1	84.0505	31.11383	PS80/224_CORE-DNA-1	Sea Ice Corer	8/9/2012	Core length [m]: 1.13	Albedo2
PS80/224-1	84.0505	31.11383	PS80/224_CORE-GEO-1	Sea Ice Corer	8/9/2012	Core length [m]: 1.24	Albedo2
PS80/224-1	84.0505	31.11383	PS80/224_CORE-GEO-2	Sea Ice Corer	8/9/2012	Core length [m]: 1.17	Albedo2
PS80/224-1	84.0505	31.11383	PS80/224_CORE-GEO-3	Sea Ice Corer	8/9/2012	Core length [m]: 1.14	Albedo2
PS80/224-1	84.0505	31.11383	PS80/224_CORE-GEO-4	Sea Ice Corer	8/11/2012	Core length [m]: 1.77; Salinity + temp core	Albedo2
PS80/224-1	84.0505	31.11383	PS80/224_CORE-GEO-5	Sea Ice Corer	8/11/2012	methane	Albedo3
PS80/224-1	84.0505	31.11383	PS80/224_CORE-GEO-6	Sea Ice Corer	8/11/2012	oxi	Albedo3
PS80/224-1	84.0505	31.11383	PS80/224_CORE-GEO-7	Sea Ice Corer	8/11/2012	archive	Albedo3
PS80/224-1	84.0505	31.11383	PS80/224_CORE-IKA-1	Sea Ice Corer	8/9/2012	Core length [m]: 1.15	Albedo3
PS80/224-1	84.0505	31.11383	PS80/224_CORE-IPM-1	Sea Ice Corer	8/9/2012	Core length [m]: 1.18	Albedo3
PS80/224-1	84.0505	31.11383	PS80/224_CORE-IPM-2	Sea Ice Corer	8/9/2012	Core length [m]: 1.17	Albedo4
PS80/224-1	84.0505	31.11383	PS80/224_CORE-LSI-1	Sea Ice Corer	8/9/2012	Core length [m]: 1.24	Albedo4
PS80/224-1	84.0505	31.11383	PS80/224_CORE-LSI-2	Sea Ice Corer	8/9/2012	Core length [m]: 1.26	Albedo4
PS80/224-1	84.0505	31.11383	PS80/224_CORE-NIT-1	Sea Ice Corer	8/9/2012	Core length [m]: 1.17	Albedo4
PS80/224-1	84.0505	31.11383	PS80/224_CORE-NIT-2	Sea Ice Corer	8/9/2012	Core length [m]: 1.18	Albedo5
PS80/224-1	84.0505	31.11383	PS80/224_CORE-OPT-1	Sea Ice Corer	8/10/2012	Core length [m]: 1.12; M13	Albedo5
PS80/224-1	84.0505	31.11383	PS80/224_CORE-OPT-1	Sea Ice Corer	8/9/2012		Albedo5
PS80/224-1	84.0505	31.11383	PS80/224_CORE-OPT-2	Sea Ice Corer	8/10/2012	Core length [m]: 0.925; M12	Albedo6
PS80/224-1	84.0505	31.11383	PS80/224_CORE-OPT-2	Sea Ice Corer	8/9/2012		AWS
PS80/224-1	84.0505	31.11383	PS80/224_CORE-OPT-3	Sea Ice Corer	8/10/2012	Core length [m]: 0.865; M8	BioGeo ADCP
PS80/224-1	84.0505	31.11383	PS80/224_CORE-OPT-4	Sea Ice Corer	8/10/2012	Core length [m]: 1.96; M21	BioGeo ADCP
PS80/224-1	84.0505	31.11383	PS80/224_CORE-OPT-5	Sea Ice Corer	8/10/2012	Core length [m]: 1.74; M23	BioGeo ADCP
PS80/224-1	84.0505	31.11383	PS80/224_CORE-OPT-6	Sea Ice Corer	8/10/2012	Core length [m]: 1.18; M23P	BioGeo ADCP

Event	**Latitude**	**Longitude**	**Label**	**Device**	**Date**	**Comment 1**	**Comment 2**
PS80/224-1	84.0505	31.11383	PS80/224_CORE-RAD-1	Sea Ice Corer	8/9/2012	Core length [m]: 1.16; Total of 7 cores. Only one core was measured because all cores will be analyzed as one sample	BioGeo ADCP
PS80/224-1	84.0505	31.11383	PS80/224_CORE-RNA-1	Sea Ice Corer	8/9/2012	Core length [m]: 1.13	BioGeo ADCP
PS80/224-1	84.0505	31.11383	PS80/224_CORE-SAL-1	Sea Ice Corer	8/9/2012	Core length [m]: 1.12	BioGeo ADCP
PS80/224-1	84.0505	31.11383	PS80/224_CORE-TEX-1	Sea Ice Corer	8/9/2012	Core length [m]: 1.19	BioGeo ADCP
PS80/224-1	84.0505	31.11383	PS80/224_CORE-TIT-1	Sea Ice Corer	8/9/2012	Core length [m]: 1.155	BioGeo ADCP
PS80/224-1	84.0505	31.11383	PS80/224_CORE-TIT-2	Sea Ice Corer	8/9/2012	Core length [m]: 1.155	BioGeo CTD
PS80/224-1	84.0505	31.11383	PS80/224_CTD-1	CTD from ice floe	8/10/2012	BioGeo CTD	BioGeo CTD
PS80/224-1	84.0505	31.11383	PS80/224_CTD-2	CTD from ice floe	8/9/2012	Biology CTD 0-50 m	BioGeo CTD
PS80/224-1	84.0505	31.11383	PS80/224_EDDY-2	Eddy mooring (Temperature and/or Oxygen sensor)	8/10/2012	BioGeo EddyO2 Dataset 1	BioGeo CTD
PS80/224-1	84.0505	31.11383	PS80/224_EDDY-2	Eddy mooring (Temperature and/or Oxygen sensor)	8/10/2012	BioGeo EddyO2 Dataset 2	BioGeo CTD
PS80/224-1	84.0505	31.11383	PS80/224_EDDY-3	Eddy mooring (Temperature and/or Oxygen sensor)	8/10/2012	BioGeo EddyO2	BioGeo CTD
PS80/224-1	84.0505	31.11383	PS80/224_EMI	Electromagnetic Induction Ice Thickness Profiler (EM31 MkII)	8/14/2012	EM31 sea ice thickness	BioGeo CTD
PS80/224-1	84.0505	31.11383	PS80/224_HP-1_MP	Hand pump	8/9/2012	meltpond 1 aggregate sample	BioGeo CTD
PS80/224-1	84.0505	31.11383	PS80/224_HP-2_MP	Hand pump	8/9/2012	meltpond 2 water sample	BioGeo CTD
PS80/224-1	84.0505	31.11383	PS80/224_HP-2_MPA	Hand pump	8/9/2012	meltpond 2 aggregate sample	BioGeo Eddy02
PS80/224-1	84.0505	31.11383	PS80/224_HP-3_MP	Hand pump	8/9/2012	meltpond 3 water sample	BioGeo EddyO2

Event	Latitude	Longitude	Label	Device	Date	Comment 1	Comment 2
PS80/224-1	84.0505	31.11383	PS80/224_HP-3_MPA	Hand pump	8/9/2012	meltpond 3 aggregate sample	BioGeo EddyO2
PS80/224-1	84.0505	31.11383	PS80/224_HP-4_MP	Hand pump	8/9/2012	meltpond 4 nutrient sample	BioGeo EddyO2
PS80/224-1	84.0505	31.11383	PS80/224_HP-5_MP	Hand pump	8/10/2012	Melt Pond 2 -N2 Fixation	BioGeo EddyO2 Dataset 1
PS80/224-1	84.0505	31.11383	PS80/224_ICES	Ice sample		Scattering Sample #2	BioGeo EddyO2 Dataset 1
PS80/224-1	84.0505	31.11383	PS80/224_ISP-1	In situ Pump	8/9/2012	Large pump: water under the ice (0-10 m)	BioGeo EddyO2 Dataset 1
PS80/224-1	84.0505	31.11383	PS80/224_ISP-2	In situ Pump	8/10/2012	Large pump: Bio Pond1	BioGeo EddyO2 Dataset 1
PS80/224-1	84.0505	31.11383	PS80/224_KB	Kemmere bottle	8/10/2012	Under Ice water sample	BioGeo EddyO2 Dataset 1
PS80/224-1	84.0505	31.11383	PS80/224_MSS-1	Microstructure Profiler for Ocean turbulance measurements	8/11/2012	BioGeo MSS Profile 1	BioGeo EddyO2 Dataset 1
PS80/224-1	84.0505	31.11383	PS80/224_MSS-2	Microstructure Profiler for Ocean turbulance measurements	8/11/2012	BioGeo MSS Profile 2	BioGeo EddyO2 Dataset 2
PS80/224-1	84.0505	31.11383	PS80/224_PERI-1	Peristaltic pump for water sampling	8/9/2012	trace metal clean water sampling	BioGeo EddyO2 Dataset 2
PS80/224-1	84.0505	31.11383	PS80/224_RAMSES-1	RAMSES hyperspectral radiometer	8/10/2012	RamsesPond+Core	BioGeo EddyO2 Dataset 2
PS80/224-1	84.0505	31.11383	PS80/224_RAMSES-2	RAMSES hyperspectral radiometer	8/10/2012	RamsesIce+Core	BioGeo EddyO2 Dataset 2
PS80/224-1	84.0505	31.11383	PS80/224_ROV	Remote operated vehicle	8/10/2012	ROV hole	BioGeo EddyO2 Dataset 2
PS80/224-1	84.0505	31.11383	PS80/224_SML-1	Sea surface micro layer	8/10/2012	Sea-surface microlayer sample	BioGeo EddyO2 Dataset 3
PS80/224-1	84.0505	31.11383	PS80/224_SML-2	Sea surface micro layer	8/10/2012	Sea-surface microlayer sample	BioGeo EddyO2 Dataset 4

Event	Latitude	Longitude	Label	Device	Date	Comment 1	Comment 2
PS80/224-1	84.0505	31.11383	PS80/224_SML-3	Sea surface micro layer	8/10/2012	Sea-surface microlayer sample	BioGeo EddyT
PS80/224-1	84.0505	31.11383	PS80/224_SML-4	Sea surface micro layer	8/10/2012	Sea-surface microlayer sample	BioGeo EddyT
PS80/224-1	84.0505	31.11383	PS80/224_TRAPSIF	Trap, sediment ice float	8/10/2012	Sediment Trap	BioGeo EddyT
PS80/237-1	83.9865	78.10333	PS80/237_ADCP	Acoustic Doppler Current Profiler from ice floe	8/14/2012	BioGeo ADCP	BioGeo EddyT
PS80/237-1	83.9865	78.10333	PS80/237_ALB-1	Surface albedo measurements	8/15/2012	Albedo selected surfaces 1	BioGeo EddyT Dataset 1
PS80/237-1	83.9865	78.10333	PS80/237_ALB-2	Surface albedo measurements	8/16/2012	Albedo selected surfaces 2	BioGeo EddyT Dataset 1
PS80/237-1	83.9865	78.10333	PS80/237_ALB-R	Surface albedo measurements	8/15/2012	Albedo ROV transect	BioGeo EddyT Dataset 1
PS80/237-1	83.9865	78.10333	PS80/237_CORE-ARC-1	Sea Ice Corer	8/14/2012	Core length [m]: 1.51	BioGeo EddyT Dataset 1
PS80/237-1	83.9865	78.10333	PS80/237_CORE-BAT-1	Sea Ice Corer	8/14/2012	Core length [m]: 1.35	BioGeo EddyT Dataset 2
PS80/237-1	83.9865	78.10333	PS80/237_CORE-BAT-2	Sea Ice Corer	8/14/2012	Core length [m]: 1.36	BioGeo EddyT Dataset 2
PS80/237-1	83.9865	78.10333	PS80/237_CORE-BAT-3	Sea Ice Corer	8/14/2012	Core length [m]: 1.4	BioGeo EddyT Dataset 2
PS80/237-1	83.9865	78.10333	PS80/237_CORE-BGC-1	Sea Ice Corer	8/14/2012	Core length [m]: 1.47	BioGeo EddyT Dataset 2
PS80/237-1	83.9865	78.10333	PS80/237_CORE-BIO-1	Sea Ice Corer	8/14/2012	Core length [m]: 1.4	BioGeo MSS Profile 1
PS80/237-1	83.9865	78.10333	PS80/237_CORE-BIO-2	Sea Ice Corer	8/14/2012	Core length [m]: 1.36	BioGeo MSS Profile 1
PS80/237-1	83.9865	78.10333	PS80/237_CORE-DEN-1	Sea Ice Corer	8/14/2012	Core length [m]: 1.53	BioGeo MSS Profile 1
PS80/237-1	83.9865	78.10333	PS80/237_CORE-DNA-1	Sea Ice Corer	8/14/2012	Core length [m]: 1.43	BioGeo MSS Profile 1
PS80/237-1	83.9865	78.10333	PS80/237_CORE-GEO-1	Sea Ice Corer	8/14/2012	Core length [m]: 1.5	BioGeo MSS Profile 1
PS80/237-1	83.9865	78.10333	PS80/237_CORE-GEO-2	Sea Ice Corer	8/14/2012	Core length [m]: 1.47	BioGeo MSS profile 1
PS80/237-1	83.9865	78.10333	PS80/237_CORE-GEO-3	Sea Ice Corer	8/14/2012	Core length [m]: 1.4	BioGeo MSS Profile 1
PS80/237-1	83.9865	78.10333	PS80/237_CORE-IKA-1	Sea Ice Corer	8/14/2012	Core length [m]: 1.4	BioGeo MSS profile 1
PS80/237-1	83.9865	78.10333	PS80/237_CORE-IPM-1	Sea Ice Corer	8/14/2012	Core length [m]: 1.67	BioGeo MSS Profile 1

Event	Latitude	Longitude	Label	Device	Date	Comment 1	Comment 2
PS80/237-1	83.9865	78.10333	PS80/237_CORE-IPM-2	Sea Ice Corer	8/14/2012	Core length [m]: 1.63	BioGeo MSS Profile 10
PS80/237-1	83.9865	78.10333	PS80/237_CORE-LSI-1	Sea Ice Corer	8/14/2012	Core length [m]: 1.65	BioGeo MSS Profile 10
PS80/237-1	83.9865	78.10333	PS80/237_CORE-LSI-2	Sea Ice Corer	8/14/2012	Core length [m]: 1.45	BioGeo MSS Profile 11
PS80/237-1	83.9865	78.10333	PS80/237_CORE-OPT-1	Sea Ice Corer	8/15/2012	Core length [m]: 1.71	BioGeo MSS Profile 11
PS80/237-1	83.9865	78.10333	PS80/237_CORE-OPT-10	Sea Ice Corer	8/15/2012	Core length [m]: 1.305; Slushy region (forming of a melt pond)	BioGeo MSS Profile 12
PS80/237-1	83.9865	78.10333	PS80/237_CORE-OPT-11	Sea Ice Corer	8/16/2012	Core length [m]: 0.72; Melt pond 1 at ROV hole. 2 liters of water added to core	BioGeo MSS Profile 12
PS80/237-1	83.9865	78.10333	PS80/237_CORE-OPT-12	Sea Ice Corer	8/16/2012	Core length [m]: 2.895; Light blue melt pond. 2 liters of water added to core sample. Whirlpool formed after core hole penetrated through and melt pond started to drain.	BioGeo MSS Profile 13
PS80/237-1	83.9865	78.10333	PS80/237_CORE-OPT-2	Sea Ice Corer	8/15/2012	Core length [m]: 1.77	BioGeo MSS Profile 13
PS80/237-1	83.9865	78.10333	PS80/237_CORE-OPT-3	Sea Ice Corer	8/15/2012	Core length [m]: 0.87; Melt Pond: ice thickness measured from bottom of ice to bottom of melt pond. There was 0.19 m above the ice surface. 0.15 m of water and 0.04 m of ice at surface.	BioGeo MSS Profile 14
PS80/237-1	83.9865	78.10333	PS80/237_CORE-OPT-4	Sea Ice Corer	8/15/2012	Core length [m]: 1.425	BioGeo MSS Profile 15
PS80/237-1	83.9865	78.10333	PS80/237_CORE-OPT-5	Sea Ice Corer	8/15/2012	Core length [m]: 1.425	BioGeo MSS Profile 16
PS80/237-1	83.9865	78.10333	PS80/237_CORE-OPT-6	Sea Ice Corer	8/15/2012	Core length [m]: 1.88	BioGeo MSS Profile 17
PS80/237-1	83.9865	78.10333	PS80/237_CORE-OPT-7	Sea Ice Corer	8/15/2012	Core length [m]: 1.66	BioGeo MSS Profile 18

Event	Latitude	Longitude	Label	Device	Date	Comment 1	Comment 2
PS80/237-1	83.9865	78.10333	PS80/237_CORE-OPT-8	Sea Ice Corer	8/15/2012	Core length [m]: 1.515	BioGeo MSS Profile 19
PS80/237-1	83.9865	78.10333	PS80/237_CORE-OPT-9	Sea Ice Corer	8/15/2012	Core length [m]: 1.27; Slushy region (forming of a melt pond)	BioGeo MSS Profile 2
PS80/237-1	83.9865	78.10333	PS80/237_CORE-RAD-1	Sea Ice Corer	8/14/2012	Core length [m]: 1.37; Total of 7 cores. Only one core was measured because all cores will be analyzed as one sample	BioGeo MSS Profile 2
PS80/237-1	83.9865	78.10333	PS80/237_CORE-RNA-1	Sea Ice Corer	8/14/2012	Core length [m]: 1.5	BioGeo MSS Profile 2
PS80/237-1	83.9865	78.10333	PS80/237_CORE-SAL-1	Sea Ice Corer	8/14/2012	Core length [m]: 1.47	BioGeo MSS Profile 2
PS80/237-1	83.9865	78.10333	PS80/237_CORE-TEX-1	Sea Ice Corer	8/14/2012	Core length [m]: 1.415	BioGeo MSS Profile 2
PS80/237-1	83.9865	78.10333	PS80/237_CORE-TIT-1	Sea Ice Corer	8/14/2012	Core length [m]: 1.38	BioGeo MSS Profile 2
PS80/237-1	83.9865	78.10333	PS80/237_CORE-TIT-2	Sea Ice Corer	8/14/2012	Core length [m]: 1.36	BioGeo MSS profile 2
PS80/237-1	83.9865	78.10333	PS80/237_CORE-TIT-3	Sea Ice Corer	8/14/2012	Core length [m]: 1.38	BioGeo MSS profile 2
PS80/237-1	83.9865	78.10333	PS80/237_CTD-1	CTD from ice floe	8/14/2012	BioGeo CTD	BioGeo MSS Profile 2
PS80/237-1	83.9865	78.10333	PS80/237_CTD-2	CTD from ice floe	8/14/2012	Biology CTD 0-50 m	BioGeo MSS Profile 20
PS80/237-1	83.9865	78.10333	PS80/237_CTD-3	CTD from ice floe	8/15/2012	Biology CTD 0-50 m	BioGeo MSS Profile 21
PS80/237-1	83.9865	78.10333	PS80/237_EDDY-1	Eddy mooring (Temperature and/or Oxygen sensor)	8/14/2012	BioGeo EddyO2 Dataset 1	BioGeo MSS Profile 22
PS80/237-1	83.9865	78.10333	PS80/237_EDDY-2	Eddy mooring (Temperature and/or Oxygen sensor)	8/15/2012	BioGeo EddyO2 Dataset 2	BioGeo MSS Profile 23
PS80/237-1	83.9865	78.10333	PS80/237_EDDY-3	Eddy mooring (Temperature and/or Oxygen sensor)	8/15/2012	BioGeo EddyO2 Dataset 3	BioGeo MSS Profile 24
PS80/237-1	83.9865	78.10333	PS80/237_EDDY-4	Eddy mooring (Temperature and/or Oxygen sensor)	8/16/2012	BioGeo EddyO2 Dataset 4	BioGeo MSS Profile 25
PS80/237-1	83.9865	78.10333	PS80/237_EDDY-5	Eddy mooring (Temperature and/or Oxygen sensor)	8/14/2012	BioGeo EddyT Dataset 1	BioGeo MSS Profile 26

Event	Latitude	Longitude	Label	Device	Date	Comment 1	Comment 2
PS80/237-1	83.9865	78.10333	PS80/237_EDDY-6	Eddy mooring (Temperature and/or Oxygen sensor)	8/15/2012	BioGeo EddyT Dataset 2	BioGeo MSS Profile 27
PS80/237-1	83.9865	78.10333	PS80/237_EMI	Electromagnetic Induction Ice Thickness Profiler (EM31 MkII)	8/20/2012	EM31 sea ice thickness	BioGeo MSS Profile 28
PS80/237-1	83.9865	78.10333	PS80/237_HP-1_MP	Hand pump	8/14/2012	meltpond 1 water sample	BioGeo MSS Profile 3
PS80/237-1	83.9865	78.10333	PS80/237_HP-2_MP	Hand pump	8/14/2012	meltpond 2 water sample	BioGeo MSS Profile 3
PS80/237-1	83.9865	78.10333	PS80/237_HP-3_MP	Hand pump	8/14/2012	meltpond 3 water sample	BioGeo MSS Profile 3
PS80/237-1	83.9865	78.10333	PS80/237_HP-4_MP	Hand pump	8/15/2012	Melt Pond 1 -N2 Fixation	BioGeo MSS profile 3
PS80/237-1	83.9865	78.10333	PS80/237_ISP-1	In situ Pump	8/14/2012	Large pump: water under the ice (0-10 m)	BioGeo MSS Profile 3
PS80/237-1	83.9865	78.10333	PS80/237_ISP-2	In situ Pump	8/15/2012	Large pump: Bio Pond3	BioGeo MSS profile 3
PS80/237-1	83.9865	78.10333	PS80/237_KB	Kemmere bottle	8/15/2012	Under Ice water sample	BioGeo MSS Profile 3
PS80/237-1	83.9865	78.10333	PS80/237_MSS-1	Microstructure Profiler for Ocean turbulance measurements	8/15/2012	BioGeo MSS Profile 1	BioGeo MSS Profile 3
PS80/237-1	83.9865	78.10333	PS80/237_MSS-2	Microstructure Profiler for Ocean turbulance measurements	8/15/2012	BioGeo MSS Profile 2	BioGeo MSS Profile 4
PS80/237-1	83.9865	78.10333	PS80/237_MSS-3	Microstructure Profiler for Ocean turbulance measurements	8/15/2012	BioGeo MSS Profile 3	BioGeo MSS Profile 4
PS80/237-1	83.9865	78.10333	PS80/237_MSS-4	Microstructure Profiler for Ocean turbulance measurements	8/15/2012	BioGeo MSS Profile 4	BioGeo MSS Profile 4

Event	Latitude	Longitude	Label	Device	Date	Comment 1	Comment 2
PS80/237-1	83.9865	78.10333	PS80/237_MSS-5	Microstructure Profiler for Ocean turbulance measurements	8/15/2012	BioGeo MSS Profile 5	BioGeo MSS profile 4
PS80/237-1	83.9865	78.10333	PS80/237_MSS-6	Microstructure Profiler for Ocean turbulance measurements	8/15/2012	BioGeo MSS Profile 6	BioGeo MSS Profile 4
PS80/237-1	83.9865	78.10333	PS80/237_PERI-1	Peristaltic pump for water sampling	8/14/2012	trace metal clean and biology water sampling	BioGeo MSS profile 4
PS80/237-1	83.9865	78.10333	PS80/237_RCM	Current meter, Aanderaa	8/14/2012	BioGeo Seaguard	BioGeo MSS Profile 4
PS80/237-1	83.9865	78.10333	PS80/237_ROV-1	Remote operated vehicle	8/20/2012	ROV1 USBL	BioGeo MSS Profile 4
PS80/237-1	83.9865	78.10333	PS80/237_ROV-2	Remote operated vehicle	9/4/2012	ROV2 USBL	BioGeo MSS Profile 5
PS80/237-1	83.9865	78.10333	PS80/237_SML-1	Sea surface micro layer	8/14/2012	Sea-surface microlayer sample	BioGeo MSS Profile 5
PS80/237-1	83.9865	78.10333	PS80/237_SML-2	Sea surface micro layer	8/14/2012	Sea-surface microlayer sample	BioGeo MSS Profile 5
PS80/237-1	83.9865	78.10333	PS80/237_SML-3	Sea surface micro layer	8/15/2012	Sea-surface microlayer sample	BioGeo MSS profile 5
PS80/237-1	83.9865	78.10333	PS80/237_SML-4	Sea surface micro layer	8/15/2012	Sea-surface microlayer sample	BioGeo MSS Profile 5
PS80/237-1	83.9865	78.10333	PS80/237_SML-5	Sea surface micro layer	8/15/2012	Sea-surface microlayer sample	BioGeo MSS profile 5
PS80/237-1	83.9865	78.10333	PS80/237_SML-6	Sea surface micro layer	8/15/2012	Sea-surface microlayer sample	BioGeo MSS Profile 5
PS80/237-1	83.9865	78.10333	PS80/237_SML-7	Sea surface micro layer	8/15/2012	Sea-surface microlayer sample	BioGeo MSS Profile 5
PS80/237-1	83.9865	78.10333	PS80/237_SML-8	Sea surface micro layer	8/15/2012	Sea-surface microlayer sample	BioGeo MSS Profile 6
PS80/237-1	83.9865	78.10333	PS80/237_TRAPSIF	Trap, sediment ice float	8/20/2012	Sediment Trap	BioGeo MSS Profile 6

Table A1: List of sea ice measurements during Polarstern cruise ARK-XXVII/3

Event	Latitude	Longitude	Label	Device	Date	Comment 1	Comment 2
PS80/237-1	83.9865	78.10333	PS80/237_UIP	Microsensor profiler	8/15/2012	BioGeo Profiler	BioGeo MSS Profile 6
PS80/255-1	82.67067	109.5895	PS80/255_ADCP	Acoustic Doppler Current Profiler from ice floe	8/20/2012	BioGeo ADCP	BioGeo MSS profile 6
PS80/255-1	82.67067	109.5895	PS80/255_ALB-1	Surface albedo measurements	8/22/2012	Albedo selected surfaces 1	BioGeo MSS Profile 6
PS80/255-1	82.67067	109.5895	PS80/255_ALB-R	Surface albedo measurements	8/21/2012	Albedo ROV transect	BioGeo MSS profile 6
PS80/255-1	82.67067	109.5895	PS80/255_ALB-T	Surface albedo measurements	8/20/2012	Albedo time sequence	BioGeo MSS Profile 6
PS80/255-1	82.67067	109.5895	PS80/255_BUOY-ITP	Buoy, Ice Tethered Profiler	8/21/2012	ITP58	BioGeo MSS Profile 6
PS80/255-1	82.67067	109.5895	PS80/255_CORE-ARC-1	Sea Ice Corer	8/20/2012	Core length [m]: 0.86	BioGeo MSS Profile 7
PS80/255-1	82.67067	109.5895	PS80/255_CORE-BAT-1	Sea Ice Corer	8/20/2012	Core length [m]: 0.9	BioGeo MSS profile 7
PS80/255-1	82.67067	109.5895	PS80/255_CORE-BAT-2	Sea Ice Corer	8/20/2012	Core length [m]: 0.88	BioGeo MSS Profile 7
PS80/255-1	82.67067	109.5895	PS80/255_CORE-BGC-1	Sea Ice Corer	8/20/2012	Core length [m]: 0.87	BioGeo MSS Profile 7
PS80/255-1	82.67067	109.5895	PS80/255_CORE-BIO-1	Sea Ice Corer	8/20/2012	Core length [m]: 0.92	BioGeo MSS profile 8
PS80/255-1	82.67067	109.5895	PS80/255_CORE-BIO-2	Sea Ice Corer	8/20/2012	Core length [m]: 0.84	BioGeo MSS Profile 8
PS80/255-1	82.67067	109.5895	PS80/255_CORE-DEN-1	Sea Ice Corer	8/20/2012	Core length [m]: 0.89	BioGeo MSS Profile 8
PS80/255-1	82.67067	109.5895	PS80/255_CORE-DNA-1	Sea Ice Corer	8/20/2012	Core length [m]: 0.9	BioGeo MSS Profile 9
PS80/255-1	82.67067	109.5895	PS80/255_CORE-GEO-1	Sea Ice Corer	8/20/2012	Core length [m]: 0.9	BioGeo MSS Profile 9
PS80/255-1	82.67067	109.5895	PS80/255_CORE-GEO-2	Sea Ice Corer	8/20/2012	Core length [m]: 0.87	BioGeo Profiler
PS80/255-1	82.67067	109.5895	PS80/255_CORE-GEO-3	Sea Ice Corer	8/20/2012	Core length [m]: 0.89	BioGeo Profiler
PS80/255-1	82.67067	109.5895	PS80/255_CORE-GEO-4	Sea Ice Corer	8/20/2012	Core length [m]: 0.79; Salinity + temp core	BioGeo Profiler
PS80/255-1	82.67067	109.5895	PS80/255_CORE-GEO-5	Sea Ice Corer	8/20/2012	methane	BioGeo Profiler
PS80/255-1	82.67067	109.5895	PS80/255_CORE-GEO-6	Sea Ice Corer	8/20/2012	oxi	BioGeo Profiler
PS80/255-1	82.67067	109.5895	PS80/255_CORE-GEO-7	Sea Ice Corer	8/20/2012	archive	BioGeo Seaguard
PS80/255-1	82.67067	109.5895	PS80/255_CORE-IKA-1	Sea Ice Corer	8/20/2012	Core length [m]: 0.85	BioGeo Seaguard
PS80/255-1	82.67067	109.5895	PS80/255_CORE-IPM-1	Sea Ice Corer	8/20/2012	Core length [m]: 0.87	BioGeo Seaguard
PS80/255-1	82.67067	109.5895	PS80/255_CORE-IPM-2	Sea Ice Corer	8/20/2012	Core length [m]: 0.89	BioGeo Seaguard
PS80/255-1	82.67067	109.5895	PS80/255_CORE-LSI-1	Sea Ice Corer	8/20/2012	Core length [m]: 0.9	BioGeo Seaguard

Event	Latitude	Longitude	Label	Device	Date	Comment 1	Comment 2
PS80/255-1	82.67067	109.5895	PS80/255_CORE-LSI-2	Sea Ice Corer	8/20/2012	Core length [m]: 0.9	BioGeo Seaguard
PS80/255-1	82.67067	109.5895	PS80/255_CORE-OPT-1	Sea Ice Corer	8/21/2012	Core length [m]: 0.765; 50 m, barrel 76	BioGeo Seaguard
PS80/255-1	82.67067	109.5895	PS80/255_CORE-OPT-2	Sea Ice Corer	8/21/2012	Core length [m]: 0.89; 10 m, bareel 56	Biology CTD 0-50 m
PS80/255-1	82.67067	109.5895	PS80/255_CORE-OPT-3	Sea Ice Corer	8/21/2012	Core length [m]: 0.51; 15 m; melt pond, barrel 69	Biology CTD 0-50 m
PS80/255-1	82.67067	109.5895	PS80/255_CORE-OPT-4	Sea Ice Corer	8/21/2012	Core length [m]: 0.86; 25 m, barrel 61	Biology CTD 0-50 m
PS80/255-1	82.67067	109.5895	PS80/255_CORE-RAD-1	Sea Ice Corer	8/20/2012	Core length [m]: 0.88; Total of 15 cores. Only one core was measured because all cores will be analyzed as one sample	Biology CTD 0-50 m
PS80/255-1	82.67067	109.5895	PS80/255_CORE-RNA-1	Sea Ice Corer	8/20/2012	Core length [m]: 0.86	Biology CTD 0-50 m
PS80/255-1	82.67067	109.5895	PS80/255_CORE-SAL-1	Sea Ice Corer	8/20/2012	Core length [m]: 0.89	Biology CTD 0-50 m
PS80/255-1	82.67067	109.5895	PS80/255_CORE-TEX-1	Sea Ice Corer	8/20/2012	Core length [m]: 0.86	Biology CTD 0-50 m
PS80/255-1	82.67067	109.5895	PS80/255_CORE-TIT-1	Sea Ice Corer	8/20/2012	Core length [m]: 0.89	Biology CTD 0-50 m
PS80/255-1	82.67067	109.5895	PS80/255_CORE-TIT-2	Sea Ice Corer	8/20/2012	Core length [m]: 0.85	Biology CTD 0-50 m
PS80/255-1	82.67067	109.5895	PS80/255_CORE-TIT-3	Sea Ice Corer	8/20/2012	Core length [m]: 0.84	Biology CTD 0-50 m
PS80/255-1	82.67067	109.5895	PS80/255_CTD-1	CTD from ice floe	8/20/2012	BioGeo CTD	Biology CTD 0-50 m
PS80/255-1	82.67067	109.5895	PS80/255_CTD-2	CTD from ice floe	8/20/2012	Biology CTD 0-50 m	Biology CTD 0-50 m
PS80/255-1	82.67067	109.5895	PS80/255_EDDY-1	Eddy mooring (Temperature and/or Oxygen sensor)	8/20/2012	BioGeo EddyO2 Dataset 1	Biology CTD 0-50 m
PS80/255-1	82.67067	109.5895	PS80/255_EDDY-2	Eddy mooring (Temperature and/or Oxygen sensor)	8/21/2012	BioGeo EddyO2 Dataset 2	Biology CTD 0-50 m
PS80/255-1	82.67067	109.5895	PS80/255_EDDY-3	Eddy mooring (Temperature and/or Oxygen sensor)	8/20/2012	BioGeo EddyT Dataset 1	bottom 40cm of ice core

Event	Latitude	Longitude	Label	Device	Date	Comment 1	Comment 2
PS80/255-1	82.67067	109.5895	PS80/255_EDDY-4	Eddy mooring (Temperature and/or Oxygen sensor)	8/21/2012	BioGeo EddyT Dataset 2	bown ice sample 1
PS80/255-1	82.67067	109.5895	PS80/255_EMI	Electromagnetic Induction Ice Thickness Profiler (EM31 MkII)	8/25/2012	EM31 sea ice thickness	brown ice sample
PS80/255-1	82.67067	109.5895	PS80/255_HP-1_MP	Hand pump	8/19/2012	meltpond 1 water sample	Camera / SVP1
PS80/255-1	82.67067	109.5895	PS80/255_HP-2_MP	Hand pump	8/19/2012	meltpond 2 water sample	core in new sea ice
PS80/255-1	82.67067	109.5895	PS80/255_HP-3_MP	Hand pump	8/19/2012	meltpond 3 water sample	core in refrozen meltpond 1 surface
PS80/255-1	82.67067	109.5895	PS80/255_HP-3_MPA	Hand pump	8/19/2012	meltpond 3 aggregate sample	core in refrozen meltpond 2 surface
PS80/255-1	82.67067	109.5895	PS80/255_HP-5_MP	Hand pump	8/19/2012	meltpond 5 aggregate sample	core in refrozen meltpond 3 surface
PS80/255-1	82.67067	109.5895	PS80/255_ICES	Ice sample		Scattering Sample #1	Core length [m]:
PS80/255-1	82.67067	109.5895	PS80/255_ISP-1	In situ Pump	8/20/2012	Large pump: water under the ice (0-10 m)	archive
PS80/255-1	82.67067	109.5895	PS80/255_ISP-2	In situ Pump	8/21/2012	Large pump: Bio Pond2	archive
PS80/255-1	82.67067	109.5895	PS80/255_KB	Kemmere bottle	8/21/2012	Under Ice water sample	methane
PS80/255-1	82.67067	109.5895	PS80/255_MSS-1	Microstructure Profiler for Ocean turbulance measurements	8/21/2012	BioGeo MSS Profile 1	methane
PS80/255-1	82.67067	109.5895	PS80/255_MSS-2	Microstructure Profiler for Ocean turbulance measurements	8/21/2012	BioGeo MSS Profile 2	oxi
PS80/255-1	82.67067	109.5895	PS80/255_MSS-3	Microstructure Profiler for Ocean turbulance measurements	8/21/2012	BioGeo MSS Profile 3	oxi

Event	Latitude	Longitude	Label	Device	Date	Comment 1	Comment 2
PS80/255-1	82.67067	109.5895	PS80/255_MSS-4	Microstructure Profiler for Ocean turbulance measurements	8/21/2012	BioGeo MSS Profile 4	Core length [m]: 0.17; Barrel 72, Stick 23, 60m on Transect at 09:00 relative to ship
PS80/255-1	82.67067	109.5895	PS80/255_MSS-5	Microstructure Profiler for Ocean turbulance measurements	8/21/2012	BioGeo MSS Profile 5	Core length [m]: 0.19; Site: M15; barrel 68
PS80/255-1	82.67067	109.5895	PS80/255_MSS-6	Microstructure Profiler for Ocean turbulance measurements	8/21/2012	BioGeo MSS Profile 6	Core length [m]: 0.2; MP-1: Melt Pond next to main coring site; 2L of water added from MP water
PS80/255-1	82.67067	109.5895	PS80/255_PERI-1	Peristaltic pump for water sampling	8/20/2012	trace metal clean and biology water sampling	Core length [m]: 0.2; MP-1Melt Pond next to main coring site; 2L of water in a separate bag to be processed
PS80/255-1	82.67067	109.5895	PS80/255_PERI-2	Peristaltic pump for water sampling	8/20/2012	trace metal clean and biology meltpond sampling	Core length [m]: 0.25; Barrel 68, Stick 18, 20m on Transect at 09:00 relative to ship
PS80/255-1	82.67067	109.5895	PS80/255_PERI-3	Peristaltic pump for water sampling	8/20/2012	trace metal clean and biology meltpond sampling	Core length [m]: 0.25; melt pond: MP surface ice = .2 m; MP water depth = 0.65 m (added 4L of water); 0.05 m of bottom ice; ice thickness measured from bottom of ice to surface of MP
PS80/255-1	82.67067	109.5895	PS80/255_RCM	Current meter, Aanderaa	8/20/2012	BioGeo Seaguard	Core length [m]: 0.31; L-Arm site 2 melt pond, barrel 68, 2L of water included

Event	Latitude	Longitude	Label	Device	Date	Comment 1	Comment 2
PS80/255-1	82.67067	109.5895	PS80/255_ROV	Remote operated vehicle	9/19/2012	ROV USBL	Core length [m]: 0.32; L-Arm site 4, barrel 77
PS80/255-1	82.67067	109.5895	PS80/255_SML-1	Sea surface micro layer	8/20/2012	Sea-surface microlayer sample	Core length [m]: 0.38; MP-1Melt Pond next to main coring site; 2L of water added from MP water
PS80/255-1	82.67067	109.5895	PS80/255_SML-2	Sea surface micro layer	8/20/2012	Sea-surface microlayer sample	Core length [m]: 0.51; 15 m; melt pond, barrel 69
PS80/255-1	82.67067	109.5895	PS80/255_SML-3	Sea surface micro layer	8/21/2012	Sea-surface microlayer sample	Core length [m]: 0.69; Barrel 77, Stick 21, 40m on Transect at 09:00 relative to ship
PS80/255-1	82.67067	109.5895	PS80/255_SML-4	Sea surface micro layer	8/21/2012	Sea-surface microlayer sample	Core length [m]: 0.695
PS80/255-1	82.67067	109.5895	PS80/255_SML-5	Sea surface micro layer	8/21/2012	Sea-surface microlayer sample	Core length [m]: 0.71; Barrel 65, Stick 7, 50m on Transect at 12:00 relative to ship
PS80/255-1	82.67067	109.5895	PS80/255_SML-6	Sea surface micro layer	8/21/2012	Sea-surface microlayer sample	Core length [m]: 0.72; Melt pond 1 at ROV hole. 2 liters of water added to core
PS80/255-1	82.67067	109.5895	PS80/255_SML-7	Sea surface micro layer	8/21/2012	Sea-surface microlayer sample	Core length [m]: 0.73; ice thickness and fb are measured to top of ice (ice /snow interface)
PS80/255-1	82.67067	109.5895	PS80/255_SML-8	Sea surface micro layer	8/21/2012	Sea-surface microlayer sample	Core length [m]: 0.74

Event	Latitude	Longitude	Label	Device	Date	Comment 1	Comment 2
PS80/255-1	82.67067	109.5895	PS80/255_TRAPSIF	Trap, sediment ice float	8/25/2012	Sediment Trap	Core length [m]: 0.74; melt pond: MP surface ice = 0.18 m; MP water depth = 0.4 m (added 2.75L of water); bottom ice = 0.58 m; ice thickness measured from bottom of ice to surface of MP
PS80/277-1	82.8825	130.1295	PS80/277_ADCP	Acoustic Doppler Current Profiler from ice floe	8/25/2012	BioGeo ADCP	Core length [m]: 0.75
PS80/277-1	82.8825	130.1295	PS80/277_ALB-1	Surface albedo measurements	8/26/2012	Albedo1	Core length [m]: 0.75; Barrel 71, Stick 5, 30m on Transect at 12:00 relative to ship
PS80/277-1	82.8825	130.1295	PS80/277_ALB-2	Surface albedo measurements	8/26/2012	Albedo2	Core length [m]: 0.765; 50 m, barrel 76
PS80/277-1	82.8825	130.1295	PS80/277_ALB-3	Surface albedo measurements	8/26/2012	Albedo3	Core length [m]: 0.77; 1L of water added for missing ice (there was a gap in the coring)
PS80/277-1	82.8825	130.1295	PS80/277_ALB-4	Surface albedo measurements	8/26/2012	Albedo4	Core length [m]: 0.78
PS80/277-1	82.8825	130.1295	PS80/277_ALB-R	Surface albedo measurements	8/26/2012	Albedo Larm sites	Core length [m]: 0.78
PS80/277-1	82.8825	130.1295	PS80/277_BUOY-IMB	Buoy, Ice Mass Balance	8/25/2012	IMB	Core length [m]: 0.78; 2L of water added for missing ice (there was a gap)
PS80/277-1	82.8825	130.1295	PS80/277_CORE-ARC-1	Sea Ice Corer	8/25/2012	Core length [m]: 0.82	Core length [m]: 0.78; L-Arm site 5 melt pond, 2L of water included, barrel 72

Event	Latitude	Longitude	Label	Device	Date	Comment 1	Comment 2
PS80/277-1	82.8825	130.1295	PS80/277_CORE-BAT-1	Sea Ice Corer	8/25/2012	Core length [m]: 0.92	Core length [m]: 0.78; MP-2 Melt Pond at end of ROV transect and where clean team sampled; 2L of water added from MP water
PS80/277-1	82.8825	130.1295	PS80/277_CORE-BAT-2	Sea Ice Corer	8/25/2012	Core length [m]: 0.89	Core length [m]: 0.78; stick 14, barrel 50
PS80/277-1	82.8825	130.1295	PS80/277_CORE-BGC-1	Sea Ice Corer	8/25/2012	Core length [m]: 0.9	Core length [m]: 0.79
PS80/277-1	82.8825	130.1295	PS80/277_CORE-BIO-1	Sea Ice Corer	8/25/2012	Core length [m]: 0.9	Core length [m]: 0.79
PS80/277-1	82.8825	130.1295	PS80/277_CORE-BIO-2	Sea Ice Corer	8/25/2012	Core length [m]: 0.9	Core length [m]: 0.79
PS80/277-1	82.8825	130.1295	PS80/277_CORE-DEN-1	Sea Ice Corer	8/25/2012	Core length [m]: 0.82	Core length [m]: 0.79
PS80/277-1	82.8825	130.1295	PS80/277_CORE-DNA-1	Sea Ice Corer	8/25/2012	Core length [m]: 0.91	Core length [m]: 0.79
PS80/277-1	82.8825	130.1295	PS80/277_CORE-GEO-1	Sea Ice Corer	8/25/2012	Core length [m]: 0.9	Core length [m]: 0.79; Salinity + temp core
PS80/277-1	82.8825	130.1295	PS80/277_CORE-GEO-2	Sea Ice Corer	8/25/2012	Core length [m]: 0.9	Core length [m]: 0.8
PS80/277-1	82.8825	130.1295	PS80/277_CORE-GEO-3	Sea Ice Corer	8/25/2012	Core length [m]: 0.85	Core length [m]: 0.8
PS80/277-1	82.8825	130.1295	PS80/277_CORE-GEO-4	Sea Ice Corer	8/26/2012	Core length [m]: 1.6; Salinity + temp core	Core length [m]: 0.8
PS80/277-1	82.8825	130.1295	PS80/277_CORE-GEO-5	Sea Ice Corer	8/26/2012	Core length [m]: 1.54; methane	Core length [m]: 0.8; Total of 20 cores. Only one core was measured because all cores will be analyzed as one sample
PS80/277-1	82.8825	130.1295	PS80/277_CORE-GEO-6	Sea Ice Corer	8/26/2012	Core length [m]: 1.55; oxi	Core length [m]: 0.81
PS80/277-1	82.8825	130.1295	PS80/277_CORE-GEO-7	Sea Ice Corer	8/26/2012	Core length [m]: 1.54; archive	Core length [m]: 0.81
PS80/277-1	82.8825	130.1295	PS80/277_CORE-IKA-1	Sea Ice Corer	8/25/2012	Core length [m]: 0.85	Core length [m]: 0.81
PS80/277-1	82.8825	130.1295	PS80/277_CORE-IPM-1	Sea Ice Corer	8/25/2012	Core length [m]: 0.85	Core length [m]: 0.81
PS80/277-1	82.8825	130.1295	PS80/277_CORE-IPM-2	Sea Ice Corer	8/25/2012	Core length [m]: 0.92	Core length [m]: 0.81
PS80/277-1	82.8825	130.1295	PS80/277_CORE-LSI-1	Sea Ice Corer	8/25/2012	Core length [m]: 0.97	Core length [m]: 0.81
PS80/277-1	82.8825	130.1295	PS80/277_CORE-LSI-2	Sea Ice Corer	8/25/2012	Core length [m]: 0.88	Core length [m]: 0.81
PS80/277-1	82.8825	130.1295	PS80/277_CORE-OPT-1	Sea Ice Corer	8/26/2012	Core length [m]: 0.81; L-Arm site 1, barrel 62	Core length [m]: 0.81

Event	Latitude	Longitude	Label	Device	Date	Comment 1	Comment 2
PS80/277-1	82.8825	130.1295	PS80/277_CORE-OPT-2	Sea Ice Corer	8/26/2012	Core length [m]: 0.31; L-Arm site 2 melt pond, barrel 68, 2L of water included	Core length [m]: 0.81
PS80/277-1	82.8825	130.1295	PS80/277_CORE-OPT-3	Sea Ice Corer	8/26/2012	Core length [m]: 0.92; L-Arm site 3, barrel 71	Core length [m]: 0.81; L-Arm site 1, barrel 62
PS80/277-1	82.8825	130.1295	PS80/277_CORE-OPT-4	Sea Ice Corer	8/26/2012	Core length [m]: 0.32; L-Arm site 4, barrel 77	Core length [m]: 0.81; original core length was 0.85m but was adjusted to 0.81 because for that measurement the core pieces were not arranged so they fit properly.
PS80/277-1	82.8825	130.1295	PS80/277_CORE-OPT-5	Sea Ice Corer	8/26/2012	Core length [m]: 0.78; L-Arm site 5 melt pond, 2L of water included, barrel 72	Core length [m]: 0.815
PS80/277-1	82.8825	130.1295	PS80/277_CORE-RAD-1	Sea Ice Corer	8/25/2012	Core length [m]: 0.8; Total of 20 cores. Only one core was measured because all cores will be analyzed as one sample	Core length [m]: 0.815
PS80/277-1	82.8825	130.1295	PS80/277_CORE-RNA-1	Sea Ice Corer	8/25/2012	Core length [m]: 0.78	Core length [m]: 0.815
PS80/277-1	82.8825	130.1295	PS80/277_CORE-SAL-1	Sea Ice Corer	8/25/2012	Core length [m]: 0.9	Core length [m]: 0.82
PS80/277-1	82.8825	130.1295	PS80/277_CORE-SED-1	Sea Ice Corer	8/26/2012	Core length [m]: 0.85; Sediment core at L-Arm site 1	Core length [m]: 0.82
PS80/277-1	82.8825	130.1295	PS80/277_CORE-SED-1	Sea Ice Corer	8/25/2012	Core length [m]: 0.92	Core length [m]: 0.82
PS80/277-1	82.8825	130.1295	PS80/277_CORE-SED-2	Sea Ice Corer	8/26/2012	Core length [m]: 0.95; L-Arm site 3	Core length [m]: 0.82

Event	Latitude	Longitude	Label	Device	Date	Comment 1	Comment 2
PS80/277-1	82.8825	130.1295	PS80/277_CORE-TEX-1	Sea Ice Corer	8/25/2012	Core length [m]: 0.835	Core length [m]: 0.82
PS80/277-1	82.8825	130.1295	PS80/277_CORE-TIT-1	Sea Ice Corer	8/25/2012	Core length [m]: 0.87	Core length [m]: 0.82
PS80/277-1	82.8825	130.1295	PS80/277_CORE-TIT-2	Sea Ice Corer	8/25/2012	Core length [m]: 0.845	Core length [m]: 0.82
PS80/277-1	82.8825	130.1295	PS80/277_CORE-TIT-3	Sea Ice Corer	8/25/2012	Core length [m]: 0.905	Core length [m]: 0.82; Snow depths that were measured penetrated the scattering layer and therefore were overestimates.
PS80/277-1	82.8825	130.1295	PS80/277_CTD-1	CTD from ice floe	8/25/2012	BioGeo CTD	Core length [m]: 0.825
PS80/277-1	82.8825	130.1295	PS80/277_CTD-2	CTD from ice floe	8/25/2012	Biology CTD 0-50 m	Core length [m]: 0.825
PS80/277-1	82.8825	130.1295	PS80/277_EDDY-1	Eddy mooring (Temperature and/or Oxygen sensor)	8/25/2012	BioGeo EddyO2 Dataset 1	Core length [m]: 0.83
PS80/277-1	82.8825	130.1295	PS80/277_EDDY-2	Eddy mooring (Temperature and/or Oxygen sensor)	8/26/2012	BioGeo EddyO2 Dataset 2	Core length [m]: 0.83
PS80/277-1	82.8825	130.1295	PS80/277_EDDY-3	Eddy mooring (Temperature and/or Oxygen sensor)	8/25/2012	BioGeo EddyT Dataset 1	Core length [m]: 0.83
PS80/277-1	82.8825	130.1295	PS80/277_EDDY-4	Eddy mooring (Temperature and/or Oxygen sensor)	8/26/2012	BioGeo EddyT Dataset 2	Core length [m]: 0.83
PS80/277-1	82.8825	130.1295	PS80/277_EMI	Electromagnetic Induction Ice Thickness Profiler (EM31 MkII)	9/5/2012	EM31 sea ice thickness	Core length [m]: 0.835
PS80/277-1	82.8825	130.1295	PS80/277_HP-1_MP	Hand pump	8/25/2012	meltpond 1 water sample	Core length [m]: 0.84
PS80/277-1	82.8825	130.1295	PS80/277_HP-2_MPA	Hand pump	8/25/2012	meltpond 2 aggregate sample	Core length [m]: 0.84
PS80/277-1	82.8825	130.1295	PS80/277_HP-2a_MP	Hand pump	8/25/2012	meltpond 2 water sample top	Core length [m]: 0.84

Event	Latitude	Longitude	Label	Device	Date	Comment 1	Comment 2
PS80/277-1	82.8825	130.1295	PS80/277_HP-2b_MP	Hand pump	8/25/2012	meltpond 2 water sample bottom	Core length [m]: 0.84
PS80/277-1	82.8825	130.1295	PS80/277_HP-3_MP	Hand pump	8/25/2012	meltpond 3 water sample	Core length [m]: 0.84
PS80/277-1	82.8825	130.1295	PS80/277_HP-3_MPA	Hand pump	8/25/2012	meltpond 3 aggregate sample	Core length [m]: 0.84
PS80/277-1	82.8825	130.1295	PS80/277_HP-4_MP	Hand pump	8/25/2012	meltpond 4 water sample	Core length [m]: 0.84
PS80/277-1	82.8825	130.1295	PS80/277_HP-5_MP	Hand pump	8/26/2012	Melt Pond 3 -N2 Fixation	Core length [m]: 0.84
PS80/277-1	82.8825	130.1295	PS80/277_ICES-1	Ice sample		Scattering Sample #8	Core length [m]: 0.84
PS80/277-1	82.8825	130.1295	PS80/277_ICES-2	Ice sample		Scattering Sample #9	Core length [m]: 0.84
PS80/277-1	82.8825	130.1295	PS80/277_ISP-1	In situ Pump	8/25/2012	Large pump: water under the ice (0-10 m)	Core length [m]: 0.84
PS80/277-1	82.8825	130.1295	PS80/277_ISP-2	In situ Pump	8/25/2012	Large pump: Bio Pond2	Core length [m]: 0.845
PS80/277-1	82.8825	130.1295	PS80/277_KB	Kemmere bottle	8/26/2012	Under Ice water sample	Core length [m]: 0.85
PS80/277-1	82.8825	130.1295	PS80/277_MSS-1	Microstructure Profiler for Ocean turbulance measurements	8/26/2012	BioGeo MSS Profile 1	Core length [m]: 0.85
PS80/277-1	82.8825	130.1295	PS80/277_MSS-2	Microstructure Profiler for Ocean turbulance measurements	8/26/2012	BioGeo MSS Profile 2	Core length [m]: 0.85
PS80/277-1	82.8825	130.1295	PS80/277_MSS-3	Microstructure Profiler for Ocean turbulance measurements	8/26/2012	BioGeo MSS Profile 3	Core length [m]: 0.85
PS80/277-1	82.8825	130.1295	PS80/277_MSS-4	Microstructure Profiler for Ocean turbulance measurements	8/26/2012	BioGeo MSS Profile 4	Core length [m]: 0.85
PS80/277-1	82.8825	130.1295	PS80/277_MSS-5	Microstructure Profiler for Ocean turbulance measurements	8/26/2012	BioGeo MSS Profile 5	Core length [m]: 0.85

Event	Latitude	Longitude	Label	Device	Date	Comment 1	Comment 2
PS80/277-1	82.8825	130.1295	PS80/277_MSS-6	Microstructure Profiler for Ocean turbulance measurements	8/26/2012	BioGeo MSS Profile 6	Core length [m]: 0.85
PS80/277-1	82.8825	130.1295	PS80/277_MSS-7	Microstructure Profiler for Ocean turbulance measurements	8/26/2012	BioGeo MSS Profile 7	Core length [m]: 0.85
PS80/277-1	82.8825	130.1295	PS80/277_PERI-1	Peristaltic pump for water sampling	8/25/2012	trace metal clean and biology water sampling	Core length [m]: 0.85
PS80/277-1	82.8825	130.1295	PS80/277_PERI-2	Peristaltic pump for water sampling	8/25/2012	trace metal clean and biology meltpond sampling	Core length [m]: 0.85
PS80/277-1	82.8825	130.1295	PS80/277_PERI-3	Peristaltic pump for water sampling	8/25/2012	trace metal clean and biology meltpond sampling	Core length [m]: 0.85; archive
PS80/277-1	82.8825	130.1295	PS80/277_RAMSES-1	RAMSES hyperspectral radiometer	8/25/2012	Optic1+Core	Core length [m]: 0.85; Sediment core at L-Arm site 1
PS80/277-1	82.8825	130.1295	PS80/277_RAMSES-2	RAMSES hyperspectral radiometer	8/25/2012	Optic2+Core	Core length [m]: 0.86
PS80/277-1	82.8825	130.1295	PS80/277_RAMSES-3	RAMSES hyperspectral radiometer	8/25/2012	Optic3+Core	Core length [m]: 0.86
PS80/277-1	82.8825	130.1295	PS80/277_RAMSES-4	RAMSES hyperspectral radiometer	8/25/2012	Optic4+Core	Core length [m]: 0.86
PS80/277-1	82.8825	130.1295	PS80/277_RAMSES-5	RAMSES hyperspectral radiometer	8/25/2012	Optic5+Core	Core length [m]: 0.86
PS80/277-1	82.8825	130.1295	PS80/277_RCM	Current meter, Aanderaa	8/25/2012	BioGeo Seaguard	Core length [m]: 0.86
PS80/277-1	82.8825	130.1295	PS80/277_SML-1	Sea surface micro layer	8/26/2012	Sea-surface microlayer sample	Core length [m]: 0.86; 25 m, barrel 61
PS80/277-1	82.8825	130.1295	PS80/277_SML-2	Sea surface micro layer	8/26/2012	Sea-surface microlayer sample	Core length [m]: 0.86; methane
PS80/277-1	82.8825	130.1295	PS80/277_SML-3	Sea surface micro layer	8/26/2012	Sea-surface microlayer sample	Core length [m]: 0.865; barrel 23

Event	Latitude	Longitude	Label	Device	Date	Comment 1	Comment 2
PS80/277-1	82.8825	130.1295	PS80/277_SML-4	Sea surface micro layer	8/26/2012	Sea-surface microlayer sample	Core length [m]: 0.865; M8
PS80/277-1	82.8825	130.1295	PS80/277_SML-5	Sea surface micro layer	8/26/2012	Sea-surface microlayer sample	Core length [m]: 0.87
PS80/277-1	82.8825	130.1295	PS80/277_SML-6	Sea surface micro layer	8/26/2012	Sea-surface microlayer sample	Core length [m]: 0.87
PS80/277-1	82.8825	130.1295	PS80/277_TRAPSIF	Trap, sediment ice float	9/4/2012	Sediment Trap	Core length [m]: 0.87
PS80/277-1	82.8825	130.1295	PS80/277_UIP	Microsensor profiler	8/26/2012	BioGeo Profiler	Core length [m]: 0.87
PS80/323-1	81.9255	131.1287	PS80/323_ADCP	Acoustic Doppler Current Profiler from ice floe	9/4/2012	BioGeo ADCP	Core length [m]: 0.87
PS80/323-1	81.9255	131.1287	PS80/323_ALB-1	Surface albedo measurements	9/4/2012	Albedo1	Core length [m]: 0.87
PS80/323-1	81.9255	131.1287	PS80/323_ALB-2	Surface albedo measurements	9/4/2012	Albedo2	Core length [m]: 0.87; Melt Pond: ice thickness measured from bottom of ice to bottom of melt pond. There was 0.19 m above the ice surface. 0.15 m of water and 0.04 m of ice at surface.
PS80/323-1	81.9255	131.1287	PS80/323_ALB-3	Surface albedo measurements	9/4/2012	Albedo3	Core length [m]: 0.87; oxi
PS80/323-1	81.9255	131.1287	PS80/323_ALB-4	Surface albedo measurements	9/4/2012	Albedo4	Core length [m]: 0.88
PS80/323-1	81.9255	131.1287	PS80/323_ALB-5	Surface albedo measurements	9/4/2012	Albedo5	Core length [m]: 0.88
PS80/323-1	81.9255	131.1287	PS80/323_ALB-R	Surface albedo measurements	9/4/2012	Albedo ROV transect	Core length [m]: 0.88

Event	Latitude	Longitude	Label	Device	Date	Comment 1	Comment 2
PS80/323-1	81.9255	131.1287	PS80/323_BUOY-IMB	Buoy, Ice Mass Balance		IMB	Core length [m]: 0.88; Big gap within core: 2 core measurements (RAD-1 and RAD-2)
PS80/323-1	81.9255	131.1287	PS80/323_BUOY-ITP	Buoy, Ice Tethered Profiler	9/5/2012	ITP57	Core length [m]: 0.88; stick 3, barrel 54
PS80/323-1	81.9255	131.1287	PS80/323_BUOY-TEMP	BUOY-TEMP		Temp Chain	Core length [m]: 0.88; Total of 15 cores. Only one core was measured because all cores will be analyzed as one sample
PS80/323-1	81.9255	131.1287	PS80/323_CORE-ARC-1	Sea Ice Corer	9/4/2012	Core length [m]: 0.815	Core length [m]: 0.89
PS80/323-1	81.9255	131.1287	PS80/323_CORE-BAT-1	Sea Ice Corer	9/4/2012	Core length [m]: 0.81	Core length [m]: 0.89
PS80/323-1	81.9255	131.1287	PS80/323_CORE-BAT-2	Sea Ice Corer	9/4/2012	Core length [m]: 0.81; original core length was 0.85m but was adjusted to 0.81 because for that measurement the core pieces were not arranged so they fit properly.	Core length [m]: 0.89
PS80/323-1	81.9255	131.1287	PS80/323_CORE-BGC-1	Sea Ice Corer	9/4/2012	Core length [m]: 0.82	Core length [m]: 0.89
PS80/323-1	81.9255	131.1287	PS80/323_CORE-BIO-1	Sea Ice Corer	9/4/2012	Core length [m]: 0.81	Core length [m]: 0.89
PS80/323-1	81.9255	131.1287	PS80/323_CORE-BIO-2	Sea Ice Corer	9/4/2012	Core length [m]: 0.815	Core length [m]: 0.89
PS80/323-1	81.9255	131.1287	PS80/323_CORE-DEN-1	Sea Ice Corer	9/4/2012	Core length [m]: 0.825	Core length [m]: 0.89
PS80/323-1	81.9255	131.1287	PS80/323_CORE-DNA-1	Sea Ice Corer	9/4/2012	Core length [m]: 0.81	Core length [m]: 0.89
PS80/323-1	81.9255	131.1287	PS80/323_CORE-GEO-1	Sea Ice Corer	9/4/2012	Core length [m]: 0.81	Core length [m]: 0.89
PS80/323-1	81.9255	131.1287	PS80/323_CORE-GEO-2	Sea Ice Corer	9/4/2012	Core length [m]: 0.81	Core length [m]: 0.89
PS80/323-1	81.9255	131.1287	PS80/323_CORE-GEO-3	Sea Ice Corer	9/4/2012	Core length [m]: 0.79	Core length [m]: 0.89; 10 m, bareel 56
PS80/323-1	81.9255	131.1287	PS80/323_CORE-IKA-1	Sea Ice Corer	9/4/2012	Core length [m]: 0.82	Core length [m]: 0.9
PS80/323-1	81.9255	131.1287	PS80/323_CORE-IPM-1	Sea Ice Corer	9/4/2012	Core length [m]: 0.815	Core length [m]: 0.9
PS80/323-1	81.9255	131.1287	PS80/323_CORE-IPM-2	Sea Ice Corer	9/4/2012	Core length [m]: 0.83	Core length [m]: 0.9

Event	Latitude	Longitude	Label	Device	Date	Comment 1	Comment 2
PS80/323-1	81.9255	131.1287	PS80/323_CORE-LSI-1	Sea Ice Corer	9/4/2012	Core length [m]: 0.85	Core length [m]: 0.9
PS80/323-1	81.9255	131.1287	PS80/323_CORE-LSI-2	Sea Ice Corer	9/4/2012	Core length [m]: 0.85	Core length [m]: 0.9
PS80/323-1	81.9255	131.1287	PS80/323_CORE-NIT-1	Sea Ice Corer	9/4/2012	Core length [m]: 0.82	Core length [m]: 0.9
PS80/323-1	81.9255	131.1287	PS80/323_CORE-OPT-1	Sea Ice Corer	9/5/2012	Core length [m]: 1.805; Barrel 61, Stick 11, 70m on Transect at 12:00 relative to ship (ice thickness and fb to the snow/ice interface)	Core length [m]: 0.9
PS80/323-1	81.9255	131.1287	PS80/323_CORE-OPT-2	Sea Ice Corer	9/5/2012	Core length [m]: 0.71; Barrel 65, Stick 7, 50m on Transect at 12:00 relative to ship	Core length [m]: 0.9
PS80/323-1	81.9255	131.1287	PS80/323_CORE-OPT-3	Sea Ice Corer	9/5/2012	Core length [m]: 0.75; Barrel 71, Stick 5, 30m on Transect at 12:00 relative to ship	Core length [m]: 0.9
PS80/323-1	81.9255	131.1287	PS80/323_CORE-OPT-4	Sea Ice Corer	9/5/2012	Core length [m]: 0.17; Barrel 72, Stick 23, 60m on Transect at 09:00 relative to ship	Core length [m]: 0.9
PS80/323-1	81.9255	131.1287	PS80/323_CORE-OPT-5	Sea Ice Corer	9/5/2012	Core length [m]: 0.69; Barrel 77, Stick 21, 40m on Transect at 09:00 relative to ship	Core length [m]: 0.9
PS80/323-1	81.9255	131.1287	PS80/323_CORE-OPT-6	Sea Ice Corer	9/5/2012	Core length [m]: 0.25; Barrel 68, Stick 18, 20m on Transect at 09:00 relative to ship	Core length [m]: 0.9
PS80/323-1	81.9255	131.1287	PS80/323_CORE-RNA-1	Sea Ice Corer	9/4/2012	Core length [m]: 0.79	Core length [m]: 0.905
PS80/323-1	81.9255	131.1287	PS80/323_CORE-SAL-1	Sea Ice Corer	9/4/2012	Core length [m]: 0.8	Core length [m]: 0.91
PS80/323-1	81.9255	131.1287	PS80/323_CORE-SED-1	Sea Ice Corer	9/4/2012	Core length [m]: 0.85	Core length [m]: 0.92

Event	Latitude	Longitude	Label	Device	Date	Comment 1	Comment 2
PS80/323-1	81.9255	131.1287	PS80/323_CORE-TEX-1	Sea Ice Corer	9/4/2012	Core length [m]: 0.8	Core length [m]: 0.92
PS80/323-1	81.9255	131.1287	PS80/323_CORE-TIT-1	Sea Ice Corer	9/4/2012	Core length [m]: 0.73; ice thickness and fb are measured to top of ice (ice / snow interface)	Core length [m]: 0.92
PS80/323-1	81.9255	131.1287	PS80/323_CORE-TIT-2	Sea Ice Corer	9/4/2012	Core length [m]: 0.74	Core length [m]: 0.92
PS80/323-1	81.9255	131.1287	PS80/323_CORE-TIT-3	Sea Ice Corer	9/4/2012	Core length [m]: 0.695	Core length [m]: 0.92; L-Arm site 3, barrel 71
PS80/323-1	81.9255	131.1287	PS80/323_CTD-1	CTD from ice floe	9/4/2012	BioGeo CTD	Core length [m]: 0.92; Total of 20 cores. Only one core was measured because all cores will be analyzed as one sample
PS80/323-1	81.9255	131.1287	PS80/323_CTD-2	CTD from ice floe	9/4/2012	Biology CTD 0-50 m	Core length [m]: 0.925; M12
PS80/323-1	81.9255	131.1287	PS80/323_EDDY-1	Eddy mooring (Temperature and/or Oxygen sensor)	9/5/2012	BioGeo EddyO2 Dataset 1	Core length [m]: 0.95; L-Arm site 3
PS80/323-1	81.9255	131.1287	PS80/323_EDDY-2	Eddy mooring (Temperature and/or Oxygen sensor)	9/4/2012	BioGeo EddyT Dataset 1	Core length [m]: 0.97
PS80/323-1	81.9255	131.1287	PS80/323_EDDY-3	Eddy mooring (Temperature and/or Oxygen sensor)	9/4/2012	BioGeo EddyT Dataset 2	Core length [m]: 0.99; Site: RAMSES-Pond; barrel 72
PS80/323-1	81.9255	131.1287	PS80/323_EMI	Electromagnetic Induction Ice Thickness Profiler (EM31 MkII)	9/7/2012	EM31 sea ice thickness	Core length [m]: 1.01; oxi
PS80/323-1	81.9255	131.1287	PS80/323_HP-1_MP	Hand pump	9/4/2012	meltpond 1 water sample	Core length [m]: 1.03; Salinity + temp core
PS80/323-1	81.9255	131.1287	PS80/323_HP-1_MPA	Hand pump	9/4/2012	meltpond 1 aggregate sample	Core length [m]: 1.03; Salinity + temp core
PS80/323-1	81.9255	131.1287	PS80/323_HP-2_MP	Hand pump	9/4/2012	meltpond 2 water sample	Core length [m]: 1.06; archive

Event	Latitude	Longitude	Label	Device	Date	Comment 1	Comment 2
PS80/323-1	81.9255	131.1287	PS80/323_HP-3_MP	Hand pump	9/4/2012	meltpond 3 water sample	Core length [m]: 1.06; methane
PS80/323-1	81.9255	131.1287	PS80/323_HP-3_MPA	Hand pump	9/4/2012	meltpond 3 aggregate sample	Core length [m]: 1.12
PS80/323-1	81.9255	131.1287	PS80/323_ICES	Ice sample		Scattering Sample #3	Core length [m]: 1.12; M13
PS80/323-1	81.9255	131.1287	PS80/323_ISP-1	In situ Pump	9/5/2012	Large pump: Bio Pond1	Core length [m]: 1.13
PS80/323-1	81.9255	131.1287	PS80/323_ISP-2	In situ Pump	9/5/2012	Large pump: Bio Pond2	Core length [m]: 1.13
PS80/323-1	81.9255	131.1287	PS80/323_ISP-3	In situ Pump	9/5/2012	Large pump: Bio Pond3	Core length [m]: 1.13
PS80/323-1	81.9255	131.1287	PS80/323_KB	Kemmere bottle	9/5/2012	Under Ice water sample	Core length [m]: 1.14
PS80/323-1	81.9255	131.1287	PS80/323_MSS-1	Microstructure Profiler for Ocean turbulance measurements	9/5/2012	BioGeo MSS profile 1	Core length [m]: 1.14
PS80/323-1	81.9255	131.1287	PS80/323_MSS-2	Microstructure Profiler for Ocean turbulance measurements	9/5/2012	BioGeo MSS profile 2	Core length [m]: 1.14
PS80/323-1	81.9255	131.1287	PS80/323_MSS-3	Microstructure Profiler for Ocean turbulance measurements	9/5/2012	BioGeo MSS profile 3	Core length [m]: 1.14; Snow NOT included in ice thicknesss
PS80/323-1	81.9255	131.1287	PS80/323_MSS-4	Microstructure Profiler for Ocean turbulance measurements	9/5/2012	BioGeo MSS profile 4	Core length [m]: 1.15
PS80/323-1	81.9255	131.1287	PS80/323_MSS-5	Microstructure Profiler for Ocean turbulance measurements	9/5/2012	BioGeo MSS profile 5	Core length [m]: 1.15
PS80/323-1	81.9255	131.1287	PS80/323_MSS-6	Microstructure Profiler for Ocean turbulance measurements	9/5/2012	BioGeo MSS profile 6	Core length [m]: 1.155

Event	Latitude	Longitude	Label	Device	Date	Comment 1	Comment 2
PS80/323-1	81.9255	131.1287	PS80/323_PERI-1	Peristaltic pump for water sampling	9/4/2012	trace metal clean and biology water sampling	Core length [m]: 1.155
PS80/323-1	81.9255	131.1287	PS80/323_RCM	Current meter, Aanderaa	9/4/2012	BioGeo Seaguard	Core length [m]: 1.16
PS80/323-1	81.9255	131.1287	PS80/323_ROV	Remote operated vehicle	9/22/2012	ROV USBL	Core length [m]: 1.16; Total of 7 cores. Only one core was measured because all cores will be analyzed as one sample
PS80/323-1	81.9255	131.1287	PS80/323_SML-1	Sea surface micro layer	9/5/2012	Sea-surface microlayer sample	Core length [m]: 1.17
PS80/323-1	81.9255	131.1287	PS80/323_SML-2	Sea surface micro layer	9/5/2012	Sea-surface microlayer sample	Core length [m]: 1.17
PS80/323-1	81.9255	131.1287	PS80/323_SML-3	Sea surface micro layer	9/5/2012	Sea-surface microlayer sample	Core length [m]: 1.17
PS80/323-1	81.9255	131.1287	PS80/323_SML-4	Sea surface micro layer	9/5/2012	Sea-surface microlayer sample	Core length [m]: 1.18
PS80/323-1	81.9255	131.1287	PS80/323_SNOWS-1	Snow sample	9/5/2012	Snow sampling	Core length [m]: 1.18
PS80/323-1	81.9255	131.1287	PS80/323_TRAPSIF	Trap, sediment ice float	8/14/2012	Sediment Trap	Core length [m]: 1.18
PS80/323-1	81.9255	131.1287	PS80/323_UIP	Microsensor profiler	9/5/2012	BioGeo Profiler	Core length [m]: 1.18
PS80/335-1	85.10183	122.2453	PS80/335_ADCP	Acoustic Doppler Current Profiler from ice floe	9/7/2012	BioGeo ADCP	Core length [m]: 1.18
PS80/335-1	85.10183	122.2453	PS80/335_ALB-1	Surface albedo measurements	9/8/2012	Albedo1	Core length [m]: 1.18; M23P
PS80/335-1	85.10183	122.2453	PS80/335_ALB-2	Surface albedo measurements	9/8/2012	Albedo2	Core length [m]: 1.18; SED core was given to Anique because there was lots of biology
PS80/335-1	85.10183	122.2453	PS80/335_ALB-3	Surface albedo measurements	9/8/2012	Albedo3	Core length [m]: 1.19

Event	Latitude	Longitude	Label	Device	Date	Comment 1	Comment 2
PS80/335-1	85.10183	122.2453	PS80/335_ALB-4	Surface albedo measurements	9/8/2012	Albedo4	Core length [m]: 1.19
PS80/335-1	85.10183	122.2453	PS80/335_ALB-5	Surface albedo measurements	9/8/2012	Albedo5	Core length [m]: 1.19
PS80/335-1	85.10183	122.2453	PS80/335_ALB-6	Surface albedo measurements	9/8/2012	Albedo6	Core length [m]: 1.19
PS80/335-1	85.10183	122.2453	PS80/335_ALB-R	Surface albedo measurements	9/8/2012	Albedo ROV transect	Core length [m]: 1.2
PS80/335-1	85.10183	122.2453	PS80/335_BUOY-IMB	Buoy, Ice Mass Balance		IMP-BioGeo	Core length [m]: 1.2
PS80/335-1	85.10183	122.2453	PS80/335_BUOY-ITP	Buoy, Ice Tethered Profiler	9/8/2012	ITP60	Core length [m]: 1.205
PS80/335-1	85.10183	122.2453	PS80/335_BUOY-TEMP	BUOY-TEMP		Thermistor Buoy	Core length [m]: 1.21
PS80/335-1	85.10183	122.2453	PS80/335_CORE-ARC-1	Sea Ice Corer	9/7/2012	Core length [m]: 0.82	Core length [m]: 1.21
PS80/335-1	85.10183	122.2453	PS80/335_CORE-ARC-2	Sea Ice Corer	9/9/2012	Core length [m]: 1.34	Core length [m]: 1.22
PS80/335-1	85.10183	122.2453	PS80/335_CORE-BAT-1	Sea Ice Corer	9/7/2012	Core length [m]: 0.8	Core length [m]: 1.22
PS80/335-1	85.10183	122.2453	PS80/335_CORE-BAT-2	Sea Ice Corer	9/7/2012	Core length [m]: 0.75	Core length [m]: 1.22
PS80/335-1	85.10183	122.2453	PS80/335_CORE-BAT-3	Sea Ice Corer	9/7/2012	Core length [m]: 0.79	Core length [m]: 1.22
PS80/335-1	85.10183	122.2453	PS80/335_CORE-BGC-1	Sea Ice Corer	9/7/2012	Core length [m]: 0.84	Core length [m]: 1.22; stick 0, barrel 67
PS80/335-1	85.10183	122.2453	PS80/335_CORE-BIO-1	Sea Ice Corer	9/7/2012	Core length [m]: 0.84	Core length [m]: 1.22; Total of 17 cores (including RAD-1). All cores will be analyzed as one sample
PS80/335-1	85.10183	122.2453	PS80/335_CORE-BIO-2	Sea Ice Corer	9/7/2012	Core length [m]: 0.84	Core length [m]: 1.23
PS80/335-1	85.10183	122.2453	PS80/335_CORE-BIO-3	Sea Ice Corer	9/9/2012	Core length [m]: 1.4	Core length [m]: 1.24
PS80/335-1	85.10183	122.2453	PS80/335_CORE-BIO-4	Sea Ice Corer	9/9/2012	Core length [m]: 1.42	Core length [m]: 1.24
PS80/335-1	85.10183	122.2453	PS80/335_CORE-DEN-1	Sea Ice Corer	9/7/2012	Core length [m]: 0.84	Core length [m]: 1.24
PS80/335-1	85.10183	122.2453	PS80/335_CORE-DEN-2	Sea Ice Corer	9/9/2012	Core length [m]: 1.39	Core length [m]: 1.245
PS80/335-1	85.10183	122.2453	PS80/335_CORE-DNA-1	Sea Ice Corer	9/7/2012	Core length [m]: 0.84	Core length [m]: 1.25
PS80/335-1	85.10183	122.2453	PS80/335_CORE-DNA-2	Sea Ice Corer	9/7/2012	Core length [m]: 0.84	Core length [m]: 1.25

Event	Latitude	Longitude	Label	Device	Date	Comment 1	Comment 2
PS80/335-1	85.10183	122.2453	PS80/335_CORE-DNA-3	Sea Ice Corer	9/7/2012	Core length [m]: 0.84	Core length [m]: 1.25
PS80/335-1	85.10183	122.2453	PS80/335_CORE-DNA-4	Sea Ice Corer	9/9/2012	Core length [m]: 1.39	Core length [m]: 1.26
PS80/335-1	85.10183	122.2453	PS80/335_CORE-DNA-5	Sea Ice Corer	9/9/2012	Core length [m]: 1.49	Core length [m]: 1.26
PS80/335-1	85.10183	122.2453	PS80/335_CORE-DNA-6	Sea Ice Corer	9/9/2012	Core length [m]: 1.445	Core length [m]: 1.26
PS80/335-1	85.10183	122.2453	PS80/335_CORE-GEO-1	Sea Ice Corer	9/7/2012	Core length [m]: 0.79	Core length [m]: 1.27
PS80/335-1	85.10183	122.2453	PS80/335_CORE-GEO-2	Sea Ice Corer	9/7/2012	Core length [m]: 0.81	Core length [m]: 1.27
PS80/335-1	85.10183	122.2453	PS80/335_CORE-GEO-3	Sea Ice Corer	9/7/2012	Core length [m]: 0.81	Core length [m]: 1.27
PS80/335-1	85.10183	122.2453	PS80/335_CORE-GEO-4	Sea Ice Corer	9/9/2012	Core length [m]: 1.34	Core length [m]: 1.27
PS80/335-1	85.10183	122.2453	PS80/335_CORE-GEO-5	Sea Ice Corer	9/9/2012	Core length [m]: 1.38	Core length [m]: 1.27; Slushy region (forming of a melt pond)
PS80/335-1	85.10183	122.2453	PS80/335_CORE-GEO-6	Sea Ice Corer	9/9/2012	Core length [m]: 1.45	Core length [m]: 1.28; Sediment core taken along ROV transect 9:00 (relative to ship) at site 50 m; Stick 7
PS80/335-1	85.10183	122.2453	PS80/335_CORE-IKA-1	Sea Ice Corer	9/7/2012	Core length [m]: 0.79	Core length [m]: 1.29
PS80/335-1	85.10183	122.2453	PS80/335_CORE-IPM-1	Sea Ice Corer	9/7/2012	Core length [m]: 0.83	Core length [m]: 1.3; Total of 10 cores. Only one core was measured because all cores will be analyzed as one sample
PS80/335-1	85.10183	122.2453	PS80/335_CORE-IPM-2	Sea Ice Corer	9/7/2012	Core length [m]: 0.865; barrel 23	Core length [m]: 1.305; Slushy region (forming of a melt pond)
PS80/335-1	85.10183	122.2453	PS80/335_CORE-IPM-3	Sea Ice Corer	9/9/2012	Core length [m]: 1.32	Core length [m]: 1.32
PS80/335-1	85.10183	122.2453	PS80/335_CORE-IPM-4	Sea Ice Corer	9/9/2012	Core length [m]: 1.38	Core length [m]: 1.33
PS80/335-1	85.10183	122.2453	PS80/335_CORE-LSI-1	Sea Ice Corer	9/7/2012	Core length [m]: 0.87	Core length [m]: 1.34
PS80/335-1	85.10183	122.2453	PS80/335_CORE-LSI-2	Sea Ice Corer	9/7/2012	Core length [m]: 0.86	Core length [m]: 1.34
PS80/335-1	85.10183	122.2453	PS80/335_CORE-LSI-3	Sea Ice Corer	9/9/2012	Core length [m]: 1.49	Core length [m]: 1.35
PS80/335-1	85.10183	122.2453	PS80/335_CORE-LSI-4	Sea Ice Corer	9/9/2012	Core length [m]: 1.41	Core length [m]: 1.36

Event	Latitude	Longitude	Label	Device	Date	Comment 1	Comment 2
PS80/335-1	85.10183	122.2453	PS80/335_CORE-MAR-1	Sea Ice Corer	9/9/2012	Core length [m]: 1.435; 4 cores combined therefore only one core and corehole used for measurements; snow included	Core length [m]: 1.36
PS80/335-1	85.10183	122.2453	PS80/335_CORE-OPT-1	Sea Ice Corer	9/8/2012	Core length [m]: 1.21	Core length [m]: 1.36
PS80/335-1	85.10183	122.2453	PS80/335_CORE-OPT-2	Sea Ice Corer	9/8/2012	Core length [m]: 0.25; melt pond: MP surface ice = .2 m; MP water depth = 0.65 m (added 4L of water); 0.05 m of bottom ice; ice thickness measured from bottom of ice to surface of MP	Core length [m]: 1.37; Total of 7 cores. Only one core was measured because all cores will be analyzed as one sample
PS80/335-1	85.10183	122.2453	PS80/335_CORE-OPT-3	Sea Ice Corer	9/8/2012	Core length [m]: 1.33	Core length [m]: 1.38
PS80/335-1	85.10183	122.2453	PS80/335_CORE-OPT-4	Sea Ice Corer	9/8/2012	Core length [m]: 0.74; melt pond: MP surface ice = 0.18 m; MP water depth = 0.4 m (added 2.75L of water); bottom ice = 0.58 m; ice thickness measured from bottom of ice to surface of MP	Core length [m]: 1.38
PS80/335-1	85.10183	122.2453	PS80/335_CORE-OPT-5	Sea Ice Corer	9/8/2012	Core length [m]: 1.23	Core length [m]: 1.38
PS80/335-1	85.10183	122.2453	PS80/335_CORE-OPT-6	Sea Ice Corer	9/8/2012	Core length [m]: 1.63	Core length [m]: 1.38
PS80/335-1	85.10183	122.2453	PS80/335_CORE-RAD-1	Sea Ice Corer	9/7/2012	Core length [m]: 0.92; Total of 20 cores. Only one core was measured because all cores will be analyzed as one sample	Core length [m]: 1.39

Event	Latitude	Longitude	Label	Device	Date	Comment 1	Comment 2
PS80/335-1	85.10183	122.2453	PS80/335_CORE-RAD-2	Sea Ice Corer	9/9/2012	Core length [m]: 1.3; Total of 10 cores. Only one core was measured because all cores will be analyzed as one sample	Core length [m]: 1.39
PS80/335-1	85.10183	122.2453	PS80/335_CORE-RNA-1	Sea Ice Corer	9/7/2012	Core length [m]: 0.85	Core length [m]: 1.39
PS80/335-1	85.10183	122.2453	PS80/335_CORE-RNA-2	Sea Ice Corer	9/9/2012	Core length [m]: 1.44	Core length [m]: 1.4
PS80/335-1	85.10183	122.2453	PS80/335_CORE-SAL-1	Sea Ice Corer	9/7/2012	Core length [m]: 0.83	Core length [m]: 1.4
PS80/335-1	85.10183	122.2453	PS80/335_CORE-SAL-2	Sea Ice Corer	9/9/2012	Core length [m]: 1.27	Core length [m]: 1.4
PS80/335-1	85.10183	122.2453	PS80/335_CORE-SED-1	Sea Ice Corer	9/7/2012	Core length [m]: 0.81	Core length [m]: 1.4
PS80/335-1	85.10183	122.2453	PS80/335_CORE-SED-2	Sea Ice Corer	9/8/2012	Core length [m]: 1.28; Sediment core taken along ROV transect 9:00 (relative to ship) at site 50 m; Stick 7	Core length [m]: 1.4
PS80/335-1	85.10183	122.2453	PS80/335_CORE-SED-3	Sea Ice Corer	9/9/2012	Core length [m]: 1.42	Core length [m]: 1.41
PS80/335-1	85.10183	122.2453	PS80/335_CORE-TEX-1	Sea Ice Corer	9/7/2012	Core length [m]: 0.86	Core length [m]: 1.41
PS80/335-1	85.10183	122.2453	PS80/335_CORE-TEX-2	Sea Ice Corer	9/9/2012	Core length [m]: 1.55; core taken a few meters away from coring site (core with snow) core with 14cm titanium corer	Core length [m]: 1.415
PS80/335-1	85.10183	122.2453	PS80/335_CORE-TEX-3	Sea Ice Corer	9/9/2012	Core length [m]: 1.44	Core length [m]: 1.42
PS80/335-1	85.10183	122.2453	PS80/335_CORE-TIT-1	Sea Ice Corer	9/7/2012	Core length [m]: 0.82; Snow depths that were measured penetrated the scattering layer and therefore were overestimates.	Core length [m]: 1.42; Snow depths and scattering layers were derived after and are as follows: original snow of 0.12 = 0.06 snow and 0.06 scattering layer; original snow of 0.1 = 0.05 snow and 0.05 scattering layer.

Event	Latitude	Longitude	Label	Device	Date	Comment 1	Comment 2
PS80/335-1	85.10183	122.2453	PS80/335_CORE-TIT-2	Sea Ice Corer	9/7/2012	Core length [m]: 0.825	Core length [m]: 1.42
PS80/335-1	85.10183	122.2453	PS80/335_CORE-TIT-3	Sea Ice Corer	9/7/2012	Core length [m]: 0.81	Core length [m]: 1.425
PS80/335-1	85.10183	122.2453	PS80/335_CORE-TIT-4	Sea Ice Corer	9/9/2012	Core length [m]: 1.47; ice thickness and freeboard measured to the snow/ice interface	Core length [m]: 1.425
PS80/335-1	85.10183	122.2453	PS80/335_CORE-TIT-5	Sea Ice Corer	9/9/2012	Core length [m]: 1.42	Core length [m]: 1.43
PS80/335-1	85.10183	122.2453	PS80/335_CORE-TIT-6	Sea Ice Corer	9/9/2012	Core length [m]: 1.41	Core length [m]: 1.435; 4 cores combined therefore only one core and corehole used for measurements; snow included
PS80/335-1	85.10183	122.2453	PS80/335_CTD-1	CTD from ice floe	9/7/2012	BioGeo CTD	Core length [m]: 1.44
PS80/335-1	85.10183	122.2453	PS80/335_CTD-2	CTD from ice floe	9/7/2012	Biology CTD 0-50 m	Core length [m]: 1.44
PS80/335-1	85.10183	122.2453	PS80/335_CTD-3	CTD from ice floe	9/9/2012	Biology CTD 0-50 m	Core length [m]: 1.445
PS80/335-1	85.10183	122.2453	PS80/335_EDDY-1	Eddy mooring (Temperature and/or Oxygen sensor)	9/7/2012	BioGeo EddyT	Core length [m]: 1.45
PS80/335-1	85.10183	122.2453	PS80/335_EDDY-2	Eddy mooring (Temperature and/or Oxygen sensor)	9/7/2012	BioGeo EddyO2 Dataset 1	Core length [m]: 1.45
PS80/335-1	85.10183	122.2453	PS80/335_EDDY-3	Eddy mooring (Temperature and/or Oxygen sensor)	9/8/2012	BioGeo EddyO2 Dataset 2	Core length [m]: 1.47
PS80/335-1	85.10183	122.2453	PS80/335_EMI	Electromagnetic Induction Ice Thickness Profiler (EM31 MkII)	9/18/2012	EM31 sea ice thickness	Core length [m]: 1.47
PS80/335-1	85.10183	122.2453	PS80/335_HP-1_MP	Hand pump	9/7/2012	meltpond 1 water sample	Core length [m]: 1.47

Event	Latitude	Longitude	Label	Device	Date	Comment 1	Comment 2
PS80/335-1	85.10183	122.2453	PS80/335_HP-3_MP	Hand pump	9/7/2012	meltpond 3 water sample	Core length [m]: 1.47; ice thickness and freeboard measured to the snow/ice interface
PS80/335-1	85.10183	122.2453	PS80/335_HP-4_MP	Hand pump	9/7/2012	meltpond 4 water sample	Core length [m]: 1.49
PS80/335-1	85.10183	122.2453	PS80/335_ICES	Ice sample		Scattering Sample #4	Core length [m]: 1.49
PS80/335-1	85.10183	122.2453	PS80/335_ISP-1	In situ Pump	9/7/2012	Large pump: water under the ice (0-10 m)	Core length [m]: 1.5
PS80/335-1	85.10183	122.2453	PS80/335_ISP-2	In situ Pump	9/8/2012	Large pump: Bio Pond3	Core length [m]: 1.5
PS80/335-1	85.10183	122.2453	PS80/335_KB	Kemmere bottle	9/9/2012	Under Ice water sample	Core length [m]: 1.51
PS80/335-1	85.10183	122.2453	PS80/335_MSS-1	Microstructure Profiler for Ocean turbulance measurements	9/9/2012	BioGeo MSS Profile 1	Core length [m]: 1.515
PS80/335-1	85.10183	122.2453	PS80/335_MSS-2	Microstructure Profiler for Ocean turbulance measurements	9/9/2012	BioGeo MSS Profile 2	Core length [m]: 1.53
PS80/335-1	85.10183	122.2453	PS80/335_MSS-3	Microstructure Profiler for Ocean turbulance measurements	9/9/2012	BioGeo MSS Profile 3	Core length [m]: 1.53; Site: M5; barrel 74
PS80/335-1	85.10183	122.2453	PS80/335_MSS-4	Microstructure Profiler for Ocean turbulance measurements	9/9/2012	BioGeo MSS Profile 4	Core length [m]: 1.54; archive
PS80/335-1	85.10183	122.2453	PS80/335_MSS-5	Microstructure Profiler for Ocean turbulance measurements	9/9/2012	BioGeo MSS Profile 5	Core length [m]: 1.54; methane

Event	Latitude	Longitude	Label	Device	Date	Comment 1	Comment 2
PS80/335-1	85.10183	122.2453	PS80/335_MSS-6	Microstructure Profiler for Ocean turbulance measurements	9/9/2012	BioGeo MSS Profile 6	Core length [m]: 1.55; core taken a few meters away from coring site (core with snow) core with 14cm titanium corer
PS80/335-1	85.10183	122.2453	PS80/335_PERI-1	Peristaltic pump for water sampling	9/7/2012	trace metal clean and biology water sampling	Core length [m]: 1.55; oxi
PS80/335-1	85.10183	122.2453	PS80/335_PERI-2	Peristaltic pump for water sampling	9/7/2012	trace metal clean and biology meltpond sampling	Core length [m]: 1.57; stick 5, barrel 49; snow removed site
PS80/335-1	85.10183	122.2453	PS80/335_RCM	Current meter, Aanderaa	9/7/2012	BioGeo Seaguard	Core length [m]: 1.578; Site: RAMSES-ICE; barrel 61
PS80/335-1	85.10183	122.2453	PS80/335_ROV-1	Remote operated vehicle	9/29/2012	ROV1 USBL	Core length [m]: 1.6; Salinity + temp core
PS80/335-1	85.10183	122.2453	PS80/335_ROV-2	Remote operated vehicle	8/15/2012	ROV2 USBL	Core length [m]: 1.63
PS80/335-1	85.10183	122.2453	PS80/335_SNOWS-1	Snow sample	9/7/2012	Snow sampling	Core length [m]: 1.63
PS80/335-1	85.10183	122.2453	PS80/335_TRAPSIF	Trap, sediment ice float	9/7/2012	Sediment Trap	Core length [m]: 1.64
PS80/335-1	85.10183	122.2453	PS80/335_UIP	Microsensor profiler	9/8/2012	BioGeo Profiler	Core length [m]: 1.65
PS80/349-1	87.9335	61.21733	PS80/349_ADCP	Acoustic Doppler Current Profiler from ice floe	9/18/2012	BioGeo ADCP	Core length [m]: 1.65
PS80/349-1	87.9335	61.21733	PS80/349_ALB-1	Surface albedo measurements	9/19/2012	Albedo1	Core length [m]: 1.65; Total of 10 cores. Only one core was measured because all cores will be analyzed as one sample
PS80/349-1	87.9335	61.21733	PS80/349_ALB-2	Surface albedo measurements	9/19/2012	Albedo2	Core length [m]: 1.66
PS80/349-1	87.9335	61.21733	PS80/349_ALB-3	Surface albedo measurements	9/19/2012	Albedo3	Core length [m]: 1.67

Event	Latitude	Longitude	Label	Device	Date	Comment 1	Comment 2
PS80/349-1	87.9335	61.21733	PS80/349_ALB-R	Surface albedo measurements	9/19/2012	Albedo ROV transect	Core length [m]: 1.71
PS80/349-1	87.9335	61.21733	PS80/349_BUOY-SVP	Buoy, Surface Velocity Profiler	9/18/2012	SVP	Core length [m]: 1.74; M23
PS80/349-1	87.9335	61.21733	PS80/349_CORE-ARC-1	Sea Ice Corer	9/18/2012	Core length [m]: 1.21	Core length [m]: 1.77
PS80/349-1	87.9335	61.21733	PS80/349_CORE-BAT-1	Sea Ice Corer	9/18/2012	Core length [m]: 1.25	Core length [m]: 1.77; Salinity + temp core
PS80/349-1	87.9335	61.21733	PS80/349_CORE-BAT-2	Sea Ice Corer	9/18/2012	Core length [m]: 1.18	Core length [m]: 1.805; Barrel 61, Stick 11, 70m on Transect at 12:00 relative to ship (ice thickness and fb to the snow/ice interface)
PS80/349-1	87.9335	61.21733	PS80/349_CORE-BAT-3	Sea Ice Corer	9/18/2012	Core length [m]: 1.25	Core length [m]: 1.82
PS80/349-1	87.9335	61.21733	PS80/349_CORE-BAT-4	Sea Ice Corer	9/18/2012	Core length [m]: 1.18; SED core was given to Anique because there was lots of biology	Core length [m]: 1.84
PS80/349-1	87.9335	61.21733	PS80/349_CORE-BGC-1	Sea Ice Corer	9/18/2012	Core length [m]: 1.19	Core length [m]: 1.84
PS80/349-1	87.9335	61.21733	PS80/349_CORE-BIO-1	Sea Ice Corer	9/18/2012	Core length [m]: 1.39	Core length [m]: 1.86
PS80/349-1	87.9335	61.21733	PS80/349_CORE-BIO-2	Sea Ice Corer	9/18/2012	Core length [m]: 1.27	Core length [m]: 1.86
PS80/349-1	87.9335	61.21733	PS80/349_CORE-DEN-1	Sea Ice Corer	9/18/2012	Core length [m]: 1.22	Core length [m]: 1.88
PS80/349-1	87.9335	61.21733	PS80/349_CORE-DNA-1	Sea Ice Corer	9/18/2012	Core length [m]: 1.26	Core length [m]: 1.89
PS80/349-1	87.9335	61.21733	PS80/349_CORE-DNA-2	Sea Ice Corer	9/18/2012	Core length [m]: 1.245	Core length [m]: 1.93
PS80/349-1	87.9335	61.21733	PS80/349_CORE-DNA-3	Sea Ice Corer	9/18/2012	Core length [m]: 1.27	Core length [m]: 1.94
PS80/349-1	87.9335	61.21733	PS80/349_CORE-DNA-4	Sea Ice Corer	9/19/2012	Core length [m]: 0.2; MP-1Melt Pond next to main coring site; 2L of water in a separate bag to be processed	Core length [m]: 1.94
PS80/349-1	87.9335	61.21733	PS80/349_CORE-GEO-1	Sea Ice Corer	9/18/2012	Core length [m]: 1.18	Core length [m]: 1.95

Event	Latitude	Longitude	Label	Device	Date	Comment 1	Comment 2
PS80/349-1	87.9335	61.21733	PS80/349_CORE-GEO-2	Sea Ice Corer	9/18/2012	Core length [m]: 1.205	Core length [m]: 1.95
PS80/349-1	87.9335	61.21733	PS80/349_CORE-GEO-3	Sea Ice Corer	9/18/2012	Core length [m]: 1.16	Core length [m]: 1.95
PS80/349-1	87.9335	61.21733	PS80/349_CORE-GEO-4	Sea Ice Corer	9/19/2012	Core length [m]: 1.03; Salinity + temp core	Core length [m]: 1.96; M21
PS80/349-1	87.9335	61.21733	PS80/349_CORE-GEO-5	Sea Ice Corer	9/19/2012	Core length [m]: 0.86; methane	Core length [m]: 1.97
PS80/349-1	87.9335	61.21733	PS80/349_CORE-GEO-6	Sea Ice Corer	9/19/2012	Core length [m]: 0.87; oxi	Core length [m]: 1.97
PS80/349-1	87.9335	61.21733	PS80/349_CORE-GEO-7	Sea Ice Corer	9/19/2012	Core length [m]: 0.85; archive	Core length [m]: 1.98
PS80/349-1	87.9335	61.21733	PS80/349_CORE-IKA-1	Sea Ice Corer	9/18/2012	Core length [m]: 1.22	Core length [m]: 1.98
PS80/349-1	87.9335	61.21733	PS80/349_CORE-IPM-1	Sea Ice Corer	9/18/2012	Core length [m]: 1.19	Core length [m]: 1.985
PS80/349-1	87.9335	61.21733	PS80/349_CORE-IPM-2	Sea Ice Corer	9/18/2012	Core length [m]: 1.29	Core length [m]: 1.99
PS80/349-1	87.9335	61.21733	PS80/349_CORE-LSI-1	Sea Ice Corer	9/18/2012	Core length [m]: 1.24	Core length [m]: 2.01
PS80/349-1	87.9335	61.21733	PS80/349_CORE-LSI-2	Sea Ice Corer	9/18/2012	Core length [m]: 1.19	Core length [m]: 2.01
PS80/349-1	87.9335	61.21733	PS80/349_CORE-OPT-1	Sea Ice Corer	9/19/2012	Core length [m]: 0.2; MP-1: Melt Pond next to main coring site; 2L of water added from MP water	Core length [m]: 2.03
PS80/349-1	87.9335	61.21733	PS80/349_CORE-OPT-2	Sea Ice Corer	9/19/2012	Core length [m]: 0.38; MP-1Melt Pond next to main coring site; 2L of water added from MP water	Core length [m]: 2.04
PS80/349-1	87.9335	61.21733	PS80/349_CORE-OPT-3	Sea Ice Corer	9/19/2012	Core length [m]: 0.78; MP-2 Melt Pond at end of ROV transect and where clean team sampled; 2L of water added from MP water	Core length [m]: 2.05

Event	Latitude	Longitude	Label	Device	Date	Comment 1	Comment 2
PS80/349-1	87.9335	61.21733	PS80/349_CORE-OPT-4	Sea Ice Corer	9/19/2012	Core length [m]: 0.77; 1L of water added for missing ice (there was a gap in the coring)	Core length [m]: 2.056
PS80/349-1	87.9335	61.21733	PS80/349_CORE-OPT-5	Sea Ice Corer	9/19/2012	Core length [m]: 0.78; 2L of water added for missing ice (there was a gap)	Core length [m]: 2.1
PS80/349-1	87.9335	61.21733	PS80/349_CORE-OPT-6	Sea Ice Corer	9/19/2012	Core length [m]: 1.64	Core length [m]: 2.8; Core on a different site
PS80/349-1	87.9335	61.21733	PS80/349_CORE-OPT-7	Sea Ice Corer	9/19/2012	Core length [m]: 1.65	Core length [m]: 2.895; Light blue melt pond. 2 liters of water added to core sample. Whirlpool formed after core hole penetrated through and melt pond started to drain.
PS80/349-1	87.9335	61.21733	PS80/349_CORE-RAD-1	Sea Ice Corer	9/18/2012	Core length [m]: 0.88; Big gap within core: 2 core measurements (RAD-1 and RAD-2)	Core length [m]: 2
PS80/349-1	87.9335	61.21733	PS80/349_CORE-RAD-2	Sea Ice Corer	9/18/2012	Core length [m]: 1.22; Total of 17 cores (including RAD-1). All cores will be analyzed as one sample	Core length [m]: 2
PS80/349-1	87.9335	61.21733	PS80/349_CORE-RNA-1	Sea Ice Corer	9/18/2012	Core length [m]: 1.26	Core length [m]: 2
PS80/349-1	87.9335	61.21733	PS80/349_CORE-SAL-1	Sea Ice Corer	9/18/2012	Core length [m]: 1.22	
PS80/349-1	87.9335	61.21733	PS80/349_CORE-SED-1	Sea Ice Corer	9/18/2012	Core length [m]: 1.27	
PS80/349-1	87.9335	61.21733	PS80/349_CORE-TEX-1	Sea Ice Corer	9/18/2012	Core length [m]: 1.2	EM31 sea ice thickness

Event	Latitude	Longitude	Label	Device	Date	Comment 1	Comment 2
PS80/349-1	87.9335	61.21733	PS80/349_CORE-TIT-1	Sea Ice Corer	9/18/2012	Core length [m]: 1.14; Snow NOT included in ice thicknesss	EM31 sea ice thickness
PS80/349-1	87.9335	61.21733	PS80/349_CORE-TIT-2	Sea Ice Corer	9/18/2012	Core length [m]: 2.8; Core on a different site	EM31 sea ice thickness
PS80/349-1	87.9335	61.21733	PS80/349_CTD-1	CTD from ice floe	9/18/2012	BioGeo CTD	EM31 sea ice thickness
PS80/349-1	87.9335	61.21733	PS80/349_CTD-2	CTD from ice floe	9/18/2012	Biology CTD 0-50 m	EM31 sea ice thickness
PS80/349-1	87.9335	61.21733	PS80/349_CTD-3	CTD from ice floe	9/19/2012	Biology CTD 0-50 m	EM31 sea ice thickness
PS80/349-1	87.9335	61.21733	PS80/349_EDDY-1	Eddy mooring (Temperature and/or Oxygen sensor)	9/18/2012	BioGeo EddyO2	ice core in refrozen MP1
PS80/349-1	87.9335	61.21733	PS80/349_EDDY-2	Eddy mooring (Temperature and/or Oxygen sensor)	9/18/2012	BioGeo EddyT	IMB
PS80/349-1	87.9335	61.21733	PS80/349_HP-1_MP	Hand pump	9/18/2012	meltpond 1 water sample	IMB
PS80/349-1	87.9335	61.21733	PS80/349_HP-1_MPA	Hand pump	9/18/2012	meltpond 1 aggreagate sample	IMB
PS80/349-1	87.9335	61.21733	PS80/349_HP-2_MP	Hand pump	9/18/2012	meltpond 2 water sample	IMB
PS80/349-1	87.9335	61.21733	PS80/349_HP-2_MPA	Hand pump	9/18/2012	meltpond 2 aggreagate sample	IMB1-Biogeo
PS80/349-1	87.9335	61.21733	PS80/349_HP-3_MP	Hand pump	9/18/2012	meltpond 3 water sample	IMB2-Biogeo
PS80/349-1	87.9335	61.21733	PS80/349_HP-3_MPA	Hand pump	9/18/2012	meltpond 3 aggreagate sample	IMP-BioGeo
PS80/349-1	87.9335	61.21733	PS80/349_ICES-1	Ice sample	9/18/2012	meltpond 1 aggregates in ice	ITP57
PS80/349-1	87.9335	61.21733	PS80/349_ICES-2	Ice sample	9/18/2012	meltpond 2 aggregates in ice	ITP58
PS80/349-1	87.9335	61.21733	PS80/349_ICES-3	Ice sample	9/18/2012	meltpond 3 aggregates in ice	ITP60

Event	Latitude	Longitude	Label	Device	Date	Comment 1	Comment 2
PS80/349-1	87.9335	61.21733	PS80/349_ICES-4	Ice sample	9/17/2012	bown ice sample 1	Large pump: Bio Pond1
PS80/349-1	87.9335	61.21733	PS80/349_ICES-5	Ice sample	9/17/2012	bottom 40cm of ice core	Large pump: Bio Pond1
PS80/349-1	87.9335	61.21733	PS80/349_ICES-6	Ice sample		Scattering Sample #5	Large pump: Bio Pond1
PS80/349-1	87.9335	61.21733	PS80/349_ISP-1	In situ Pump	9/18/2012	Large pump: water under the ice (0-10 m)	Large pump: Bio Pond2
PS80/349-1	87.9335	61.21733	PS80/349_ISP-2	In situ Pump	9/19/2012	Large pump: Bio Pond3	Large pump: Bio Pond2
PS80/349-1	87.9335	61.21733	PS80/349_KB	Kemmere bottle	9/19/2012	Under Ice water sample	Large pump: Bio Pond2
PS80/349-1	87.9335	61.21733	PS80/349_MSS-1	Microstructure Profiler for Ocean turbulance measurements	9/19/2012	BioGeo MSS profile 1	Large pump: Bio Pond3
PS80/349-1	87.9335	61.21733	PS80/349_MSS-2	Microstructure Profiler for Ocean turbulance measurements	9/19/2012	BioGeo MSS profile 2	Large pump: Bio Pond3
PS80/349-1	87.9335	61.21733	PS80/349_MSS-3	Microstructure Profiler for Ocean turbulance measurements	9/19/2012	BioGeo MSS profile 3	Large pump: Bio Pond3
PS80/349-1	87.9335	61.21733	PS80/349_MSS-4	Microstructure Profiler for Ocean turbulance measurements	9/19/2012	BioGeo MSS profile 4	Large pump: Bio Pond3
PS80/349-1	87.9335	61.21733	PS80/349_MSS-5	Microstructure Profiler for Ocean turbulance measurements	9/19/2012	BioGeo MSS profile 5	Large pump: water under the ice (0-10 m)
PS80/349-1	87.9335	61.21733	PS80/349_MSS-6	Microstructure Profiler for Ocean turbulance measurements	9/19/2012	BioGeo MSS profile 6	Large pump: water under the ice (0-10 m)

Event	Latitude	Longitude	Label	Device	Date	Comment 1	Comment 2
PS80/349-1	87.9335	61.21733	PS80/349_MSS-7	Microstructure Profiler for Ocean turbulance measurements	9/19/2012	BioGeo MSS profile 7	Large pump: water under the ice (0-10 m)
PS80/349-1	87.9335	61.21733	PS80/349_MSS-8	Microstructure Profiler for Ocean turbulance measurements	9/19/2012	BioGeo MSS profile 8	Large pump: water under the ice (0-10 m)
PS80/349-1	87.9335	61.21733	PS80/349_ROV	Remote operated vehicle	9/7/2012	ROV USBL	Large pump: water under the ice (0-10 m)
PS80/349-1	87.9335	61.21733	PS80/349_SML-1	Sea surface micro layer	9/19/2012	Sea-surface microlayer sample	Large pump: water under the ice (0-10 m)
PS80/349-1	87.9335	61.21733	PS80/349_SML-2	Sea surface micro layer	9/19/2012	Sea-surface microlayer sample	Large pump: water under the ice (0-10 m)
PS80/349-1	87.9335	61.21733	PS80/349_SML-3	Sea surface micro layer	9/19/2012	Sea-surface microlayer sample	Melt Pond 1 -N2 Fixation
PS80/349-1	87.9335	61.21733	PS80/349_SML-4	Sea surface micro layer	9/19/2012	Sea-surface microlayer sample	Melt Pond 2 -N2 Fixation
PS80/349-1	87.9335	61.21733	PS80/349_SML-5	Sea surface micro layer	9/19/2012	Sea-surface microlayer sample	Melt Pond 3 -N2 Fixation
PS80/349-1	87.9335	61.21733	PS80/349_SML-6	Sea surface micro layer	9/19/2012	Sea-surface microlayer sample	meltpond 1 aggreagate sample
PS80/349-1	87.9335	61.21733	PS80/349_SNOWS-1	Snow sample	9/18/2012	Snow sampling	meltpond 1 aggregate sample
PS80/349-1	87.9335	61.21733	PS80/349_TRAPSIF	Trap, sediment ice float	9/18/2012	Sediment Trap	meltpond 1 aggregate sample
PS80/349-1	87.9335	61.21733	PS80/349_UIP	Microsensor profiler	9/19/2012	BioGeo Profiler	meltpond 1 aggregates in ice
PS80/360-1	88.82767	58.8635	PS80/360_ADCP	Acoustic Doppler Current Profiler from ice floe	9/22/2012	BioGeo ADCP	meltpond 1 water sample
PS80/360-1	88.82767	58.8635	PS80/360_ALB-1	Surface albedo measurements	9/23/2012	Albedo selected surfaces 1	meltpond 1 water sample
PS80/360-1	88.82767	58.8635	PS80/360_ALB-R	Surface albedo measurements	9/23/2012	Albedo ROV transect	meltpond 1 water sample

Event	Latitude	Longitude	Label	Device	Date	Comment 1	Comment 2
PS80/360-1	88.82767	58.8635	PS80/360_BUOY-IMB	Buoy, Ice Mass Balance	9/22/2012	IMB	meltpond 1 water sample
PS80/360-1	88.82767	58.8635	PS80/360_BUOY-POPS	Buoy, Ocean Profiler	9/22/2012	POP	meltpond 1 water sample
PS80/360-1	88.82767	58.8635	PS80/360_CORE-ARC-1	Sea Ice Corer	9/22/2012	Core length [m]: 1.86	meltpond 1 water sample
PS80/360-1	88.82767	58.8635	PS80/360_CORE-BAT-1	Sea Ice Corer	9/22/2012	Core length [m]: 1.95	meltpond 1 water sample
PS80/360-1	88.82767	58.8635	PS80/360_CORE-BAT-2	Sea Ice Corer	9/22/2012	Core length [m]: 1.93	meltpond 2 aggreagate sample
PS80/360-1	88.82767	58.8635	PS80/360_CORE-BAT-3	Sea Ice Corer	9/22/2012	Core length [m]: 2.05	meltpond 2 aggregate sample
PS80/360-1	88.82767	58.8635	PS80/360_CORE-BGC-1	Sea Ice Corer	9/22/2012	Core length [m]: 1.84	meltpond 2 aggregate sample
PS80/360-1	88.82767	58.8635	PS80/360_CORE-BIO-1	Sea Ice Corer	9/22/2012	Core length [m]: 1.94	meltpond 2 aggregates in ice
PS80/360-1	88.82767	58.8635	PS80/360_CORE-BIO-2	Sea Ice Corer	9/22/2012	Core length [m]: 1.985	meltpond 2 water sample
PS80/360-1	88.82767	58.8635	PS80/360_CORE-DEN-1	Sea Ice Corer	9/22/2012	Core length [m]: 1.94	meltpond 2 water sample
PS80/360-1	88.82767	58.8635	PS80/360_CORE-DNA-1	Sea Ice Corer	9/22/2012	Core length [m]: 2.01	meltpond 2 water sample
PS80/360-1	88.82767	58.8635	PS80/360_CORE-DNA-2	Sea Ice Corer	9/22/2012	Core length [m]: 2	meltpond 2 water sample
PS80/360-1	88.82767	58.8635	PS80/360_CORE-DNA-3	Sea Ice Corer	9/22/2012	Core length [m]: 2.1	meltpond 2 water sample
PS80/360-1	88.82767	58.8635	PS80/360_CORE-GEO-1	Sea Ice Corer	9/22/2012	Core length [m]: 1.98	meltpond 2 water sample
PS80/360-1	88.82767	58.8635	PS80/360_CORE-GEO-2	Sea Ice Corer	9/22/2012	Core length [m]: 1.95	meltpond 2 water sample bottom
PS80/360-1	88.82767	58.8635	PS80/360_CORE-GEO-3	Sea Ice Corer	9/22/2012	Core length [m]: 1.97	meltpond 2 water sample top
PS80/360-1	88.82767	58.8635	PS80/360_CORE-GEO-4	Sea Ice Corer	9/23/2012	Core length [m]: 1.03; Salinity + temp core	meltpond 3 aggreagate sample
PS80/360-1	88.82767	58.8635	PS80/360_CORE-GEO-5	Sea Ice Corer	9/23/2012	Core length [m]: 1.06; methane	meltpond 3 aggregate sample

Event	Latitude	Longitude	Label	Device	Date	Comment 1	Comment 2
PS80/360-1	88.82767	58.8635	PS80/360_CORE-GEO-6	Sea Ice Corer	9/23/2012	Core length [m]: 1.01; oxi	meltpond 3 aggregate sample
PS80/360-1	88.82767	58.8635	PS80/360_CORE-GEO-7	Sea Ice Corer	9/23/2012	Core length [m]: 1.06; archive	meltpond 3 aggregate sample
PS80/360-1	88.82767	58.8635	PS80/360_CORE-IKA-1	Sea Ice Corer	9/22/2012	Core length [m]: 1.84	meltpond 3 aggregate sample
PS80/360-1	88.82767	58.8635	PS80/360_CORE-IPM-1	Sea Ice Corer	9/22/2012	Core length [m]: 2	meltpond 3 aggregates in ice
PS80/360-1	88.82767	58.8635	PS80/360_CORE-IPM-2	Sea Ice Corer	9/22/2012	Core length [m]: 1.89	meltpond 3 water sample
PS80/360-1	88.82767	58.8635	PS80/360_CORE-LSI-1	Sea Ice Corer	9/22/2012	Core length [m]: 2	meltpond 3 water sample
PS80/360-1	88.82767	58.8635	PS80/360_CORE-LSI-2	Sea Ice Corer	9/22/2012	Core length [m]:	meltpond 3 water sample
PS80/360-1	88.82767	58.8635	PS80/360_CORE-NIT-1	Sea Ice Corer	9/22/2012	Core length [m]: 2.056	meltpond 3 water sample
PS80/360-1	88.82767	58.8635	PS80/360_CORE-NIT-2	Sea Ice Corer	9/22/2012	Core length [m]: 1.99	meltpond 3 water sample
PS80/360-1	88.82767	58.8635	PS80/360_CORE-NIT-3	Sea Ice Corer	9/22/2012	Core length [m]: 2.04	meltpond 3 water sample
PS80/360-1	88.82767	58.8635	PS80/360_CORE-NIT-4	Sea Ice Corer	9/22/2012	Core length [m]: 1.98	meltpond 3 water sample
PS80/360-1	88.82767	58.8635	PS80/360_CORE-OPT-1	Sea Ice Corer	9/23/2012	Core length [m]: 0.78; stick 14, barrel 50	meltpond 3 water sample
PS80/360-1	88.82767	58.8635	PS80/360_CORE-OPT-2	Sea Ice Corer	9/23/2012	Core length [m]: 1.57; stick 5, barrel 49; snow removed site	meltpond 4 nutrient sample
PS80/360-1	88.82767	58.8635	PS80/360_CORE-OPT-3	Sea Ice Corer	9/23/2012	Core length [m]: 0.88; stick 3, barrel 54	meltpond 4 water sample
PS80/360-1	88.82767	58.8635	PS80/360_CORE-OPT-4	Sea Ice Corer	9/23/2012	Core length [m]: 1.22; stick 0, barrel 67	meltpond 4 water sample

Event	Latitude	Longitude	Label	Device	Date	Comment 1	Comment 2
PS80/360-1	88.82767	58.8635	PS80/360_CORE-RAD-1	Sea Ice Corer	9/22/2012	Core length [m]: 1.65; Total of 10 cores. Only one core was measured because all cores will be analyzed as one sample	meltpond 5 aggregate sample
PS80/360-1	88.82767	58.8635	PS80/360_CORE-RNA-1	Sea Ice Corer	9/22/2012	Core length [m]: 2.03	Optic1+Core
PS80/360-1	88.82767	58.8635	PS80/360_CORE-SAL-1	Sea Ice Corer	9/22/2012	Core length [m]: 2.01	Optic2+Core
PS80/360-1	88.82767	58.8635	PS80/360_CORE-SED-1	Sea Ice Corer	9/22/2012	Core length [m]: 1.95	Optic3+Core
PS80/360-1	88.82767	58.8635	PS80/360_CORE-TEX-1	Sea Ice Corer	9/22/2012	Core length [m]: 1.86	Optic4+Core
PS80/360-1	88.82767	58.8635	PS80/360_CORE-TIT-1	Sea Ice Corer	9/22/2012	Core length [m]: 1.97	Optic5+Core
PS80/360-1	88.82767	58.8635	PS80/360_CORE-TIT-2	Sea Ice Corer	9/22/2012	Core length [m]: 1.82	POP
PS80/360-1	88.82767	58.8635	PS80/360_CTD-1	CTD from ice floe	9/22/2012	BioGeo CTD	RamsesIce+Core
PS80/360-1	88.82767	58.8635	PS80/360_CTD-2	CTD from ice floe	9/22/2012	Biology CTD 0-50 m	RamsesPond+Core
PS80/360-1	88.82767	58.8635	PS80/360_CTD-3	CTD from ice floe	9/23/2012	Biology CTD 0-50 m	ROV hole
PS80/360-1	88.82767	58.8635	PS80/360_EDDY-1	Eddy mooring (Temperature and/or Oxygen sensor)	9/22/2012	BioGeo EddyO2	ROV M15 / BioGeo Profiler
PS80/360-1	88.82767	58.8635	PS80/360_EDDY-2	Eddy mooring (Temperature and/or Oxygen sensor)	9/22/2012	BioGeo EddyT	ROV USBL
PS80/360-1	88.82767	58.8635	PS80/360_HP-1_MP	Hand pump	9/22/2012	meltpond 1 water sample	ROV USBL
PS80/360-1	88.82767	58.8635	PS80/360_HP-2_MP	Hand pump	9/22/2012	meltpond 2 water sample	ROV USBL
PS80/360-1	88.82767	58.8635	PS80/360_HP-3_MP	Hand pump	9/22/2012	meltpond 3 water sample	ROV USBL
PS80/360-1	88.82767	58.8635	PS80/360_ICES-1	Ice sample	9/22/2012	brown ice sample	ROV USBL
PS80/360-1	88.82767	58.8635	PS80/360_ICES-2	Ice sample	9/22/2012	ice core in refrozen MP1	ROV1 USBL
PS80/360-1	88.82767	58.8635	PS80/360_ICES-3	Ice sample		Scattering Sample #6	ROV1 USBL
PS80/360-1	88.82767	58.8635	PS80/360_ISP-1	In situ Pump	9/22/2012	Large pump: water under the ice (0-10 m)	ROV2 USBL

Event	Latitude	Longitude	Label	Device	Date	Comment 1	Comment 2
PS80/360-1	88.82767	58.8635	PS80/360_ISP-2	In situ Pump	9/23/2012	Large pump: Bio Pond1	ROV2 USBL
PS80/360-1	88.82767	58.8635	PS80/360_KB	Kemmere bottle	9/23/2012	Under Ice water sample	Scattering Sample #1
PS80/360-1	88.82767	58.8635	PS80/360_MSS-1	Microstructure Profiler for Ocean turbulance measurements	9/22/2012	BioGeo MSS Profile 1	Scattering Sample #2
PS80/360-1	88.82767	58.8635	PS80/360_MSS-10	Microstructure Profiler for Ocean turbulance measurements	9/23/2012	BioGeo MSS Profile 10	Scattering Sample #3
PS80/360-1	88.82767	58.8635	PS80/360_MSS-11	Microstructure Profiler for Ocean turbulance measurements	9/23/2012	BioGeo MSS Profile 11	Scattering Sample #4
PS80/360-1	88.82767	58.8635	PS80/360_MSS-12	Microstructure Profiler for Ocean turbulance measurements	9/23/2012	BioGeo MSS Profile 12	Scattering Sample #5
PS80/360-1	88.82767	58.8635	PS80/360_MSS-13	Microstructure Profiler for Ocean turbulance measurements	9/23/2012	BioGeo MSS Profile 13	Scattering Sample #6
PS80/360-1	88.82767	58.8635	PS80/360_MSS-14	Microstructure Profiler for Ocean turbulance measurements	9/23/2012	BioGeo MSS Profile 14	Scattering Sample #7
PS80/360-1	88.82767	58.8635	PS80/360_MSS-15	Microstructure Profiler for Ocean turbulance measurements	9/23/2012	BioGeo MSS Profile 15	Scattering Sample #8
PS80/360-1	88.82767	58.8635	PS80/360_MSS-16	Microstructure Profiler for Ocean turbulance measurements	9/23/2012	BioGeo MSS Profile 16	Scattering Sample #9
PS80/360-1	88.82767	58.8635	PS80/360_MSS-17	Microstructure Profiler for Ocean turbulance measurements	9/23/2012	BioGeo MSS Profile 17	Sea-surface microlayer sample

Event	Latitude	Longitude	Label	Device	Date	Comment 1	Comment 2
PS80/360-1	88.82767	58.8635	PS80/360_MSS-18	Microstructure Profiler for Ocean turbulance measurements	9/23/2012	BioGeo MSS Profile 18	Sea-surface microlayer sample
PS80/360-1	88.82767	58.8635	PS80/360_MSS-19	Microstructure Profiler for Ocean turbulance measurements	9/23/2012	BioGeo MSS Profile 19	Sea-surface microlayer sample
PS80/360-1	88.82767	58.8635	PS80/360_MSS-2	Microstructure Profiler for Ocean turbulance measurements	9/22/2012	BioGeo MSS Profile 2	Sea-surface microlayer sample
PS80/360-1	88.82767	58.8635	PS80/360_MSS-20	Microstructure Profiler for Ocean turbulance measurements	9/23/2012	BioGeo MSS Profile 20	Sea-surface microlayer sample
PS80/360-1	88.82767	58.8635	PS80/360_MSS-21	Microstructure Profiler for Ocean turbulance measurements	9/23/2012	BioGeo MSS Profile 21	Sea-surface microlayer sample
PS80/360-1	88.82767	58.8635	PS80/360_MSS-22	Microstructure Profiler for Ocean turbulance measurements	9/23/2012	BioGeo MSS Profile 22	Sea-surface microlayer sample
PS80/360-1	88.82767	58.8635	PS80/360_MSS-23	Microstructure Profiler for Ocean turbulance measurements	9/23/2012	BioGeo MSS Profile 23	Sea-surface microlayer sample
PS80/360-1	88.82767	58.8635	PS80/360_MSS-24	Microstructure Profiler for Ocean turbulance measurements	9/23/2012	BioGeo MSS Profile 24	Sea-surface microlayer sample
PS80/360-1	88.82767	58.8635	PS80/360_MSS-25	Microstructure Profiler for Ocean turbulance measurements	9/23/2012	BioGeo MSS Profile 25	Sea-surface microlayer sample
PS80/360-1	88.82767	58.8635	PS80/360_MSS-26	Microstructure Profiler for Ocean turbulance measurements	9/23/2012	BioGeo MSS Profile 26	Sea-surface microlayer sample

Event	Latitude	Longitude	Label	Device	Date	Comment 1	Comment 2
PS80/360-1	88.82767	58.8635	PS80/360_MSS-27	Microstructure Profiler for Ocean turbulance measurements	9/23/2012	BioGeo MSS Profile 27	Sea-surface microlayer sample
PS80/360-1	88.82767	58.8635	PS80/360_MSS-28	Microstructure Profiler for Ocean turbulance measurements	9/23/2012	BioGeo MSS Profile 28	Sea-surface microlayer sample
PS80/360-1	88.82767	58.8635	PS80/360_MSS-3	Microstructure Profiler for Ocean turbulance measurements	9/22/2012	BioGeo MSS Profile 3	Sea-surface microlayer sample
PS80/360-1	88.82767	58.8635	PS80/360_MSS-4	Microstructure Profiler for Ocean turbulance measurements	9/22/2012	BioGeo MSS Profile 4	Sea-surface microlayer sample
PS80/360-1	88.82767	58.8635	PS80/360_MSS-5	Microstructure Profiler for Ocean turbulance measurements	9/23/2012	BioGeo MSS Profile 5	Sea-surface microlayer sample
PS80/360-1	88.82767	58.8635	PS80/360_MSS-6	Microstructure Profiler for Ocean turbulance measurements	9/23/2012	BioGeo MSS Profile 6	Sea-surface microlayer sample
PS80/360-1	88.82767	58.8635	PS80/360_MSS-7	Microstructure Profiler for Ocean turbulance measurements	9/23/2012	BioGeo MSS Profile 7	Sea-surface microlayer sample
PS80/360-1	88.82767	58.8635	PS80/360_MSS-8	Microstructure Profiler for Ocean turbulance measurements	9/23/2012	BioGeo MSS Profile 8	Sea-surface microlayer sample
PS80/360-1	88.82767	58.8635	PS80/360_MSS-9	Microstructure Profiler for Ocean turbulance measurements	9/23/2012	BioGeo MSS Profile 9	Sea-surface microlayer sample
PS80/360-1	88.82767	58.8635	PS80/360_PERI-1	Peristaltic pump for water sampling	9/22/2012	trace metal clean and biology water sampling	Sea-surface microlayer sample

Event	Latitude	Longitude	Label	Device	Date	Comment 1	Comment 2
PS80/360-1	88.82767	58.8635	PS80/360_PERI-2	Peristaltic pump for water sampling	9/22/2012	trace metal clean and biology meltpond sampling	Sea-surface microlayer sample
PS80/360-1	88.82767	58.8635	PS80/360_RCM	Current meter, Aanderaa	9/22/2012	BioGeo Seaguard	Sea-surface microlayer sample
PS80/360-1	88.82767	58.8635	PS80/360_ROV	Remote operated vehicle	8/16/2012	ROV USBL	Sea-surface microlayer sample
PS80/360-1	88.82767	58.8635	PS80/360_SNOWS-1	Snow sample	9/22/2012	Snow sampling	Sea-surface microlayer sample
PS80/360-1	88.82767	58.8635	PS80/360_TRAPSIF	Trap, sediment ice float	9/22/2012	Sediment Trap	Sea-surface microlayer sample
PS80/360-1	88.82767	58.8635	PS80/360_UIP	Microsensor profiler		ROV M15 / BioGeo Profiler	Sea-surface microlayer sample
PS80/384-1	84.37483	17.45367	PS80/384_ADCP	Acoustic Doppler Current Profiler from ice floe	9/28/2012	BioGeo ADCP	Sea-surface microlayer sample
PS80/384-1	84.37483	17.45367	PS80/384_ALB-1	Surface albedo measurements	9/29/2012	Albedo selected surfaces 1	Sea-surface microlayer sample
PS80/384-1	84.37483	17.45367	PS80/384_ALB-R	Surface albedo measurements	9/29/2012	Albedo ROV transect	Sea-surface microlayer sample
PS80/384-1	84.37483	17.45367	PS80/384_BUOY-IMB	Buoy, Ice Mass Balance		IMB	Sea-surface microlayer sample
PS80/384-1	84.37483	17.45367	PS80/384_CORE-ARC-1	Sea Ice Corer	9/28/2012	Core length [m]: 0.89	Sea-surface microlayer sample
PS80/384-1	84.37483	17.45367	PS80/384_CORE-BAT-1	Sea Ice Corer	9/28/2012	Core length [m]: 0.84	Sea-surface microlayer sample
PS80/384-1	84.37483	17.45367	PS80/384_CORE-BGC-1	Sea Ice Corer	9/28/2012	Core length [m]: 0.89	Sea-surface microlayer sample
PS80/384-1	84.37483	17.45367	PS80/384_CORE-BIO-1	Sea Ice Corer	9/28/2012	Core length [m]: 0.78	Sea-surface microlayer sample
PS80/384-1	84.37483	17.45367	PS80/384_CORE-BIO-2	Sea Ice Corer	9/28/2012	Core length [m]: 0.84	Sea-surface microlayer sample

Event	Latitude	Longitude	Label	Device	Date	Comment 1	Comment 2
PS80/384-1	84.37483	17.45367	PS80/384_CORE-DEN-1	Sea Ice Corer	9/28/2012	Core length [m]: 0.89	Sediment Trap
PS80/384-1	84.37483	17.45367	PS80/384_CORE-DNA-1	Sea Ice Corer	9/28/2012	Core length [m]: 0.83	Sediment Trap
PS80/384-1	84.37483	17.45367	PS80/384_CORE-GEO-1	Sea Ice Corer	9/28/2012	Core length [m]: 0.82	Sediment Trap
PS80/384-1	84.37483	17.45367	PS80/384_CORE-GEO-2	Sea Ice Corer	9/28/2012	Core length [m]: 0.85	Sediment Trap
PS80/384-1	84.37483	17.45367	PS80/384_CORE-OPT-1	Sea Ice Corer	9/29/2012	Core length [m]: 1.578; Site: RAMSES-ICE; barrel 61	Sediment Trap
PS80/384-1	84.37483	17.45367	PS80/384_CORE-OPT-2	Sea Ice Corer	9/29/2012	Core length [m]: 0.99; Site: RAMSES-Pond; barrel 72	Sediment Trap
PS80/384-1	84.37483	17.45367	PS80/384_CORE-OPT-3	Sea Ice Corer	9/29/2012	Core length [m]: 1.53; Site: M5; barrel 74	Sediment Trap
PS80/384-1	84.37483	17.45367	PS80/384_CORE-OPT-4	Sea Ice Corer	9/29/2012	Core length [m]: 0.19; Site: M15; barrel 68	Sediment Trap
PS80/384-1	84.37483	17.45367	PS80/384_CORE-RNA-1	Sea Ice Corer	9/28/2012	Core length [m]: 0.87	Sediment Trap
PS80/384-1	84.37483	17.45367	PS80/384_CORE-SAL-1	Sea Ice Corer	9/28/2012	Core length [m]: 0.89	Snow sampling
PS80/384-1	84.37483	17.45367	PS80/384_CORE-SED-1	Sea Ice Corer	9/28/2012	Core length [m]: 0.88	Snow sampling
PS80/384-1	84.37483	17.45367	PS80/384_CORE-TEX-1	Sea Ice Corer	9/28/2012	Core length [m]: 0.9	Snow sampling
PS80/384-1	84.37483	17.45367	PS80/384_CTD-1	CTD from ice floe	9/28/2012	BioGeo CTD	Snow sampling
PS80/384-1	84.37483	17.45367	PS80/384_CTD-2	CTD from ice floe	9/28/2012	Biology CTD 0-50 m	Snow sampling
PS80/384-1	84.37483	17.45367	PS80/384_CTD-3	CTD from ice floe	9/29/2012	Biology CTD 0-50 m	SVP
PS80/384-1	84.37483	17.45367	PS80/384_EDDY-1	Eddy mooring (Temperature and/or Oxygen sensor)	9/28/2012	BioGeo Eddy02	SVP2 Ridge
PS80/384-1	84.37483	17.45367	PS80/384_EDDY-2	Eddy mooring (Temperature and/or Oxygen sensor)	9/28/2012	BioGeo EddyT	Temp Chain
PS80/384-1	84.37483	17.45367	PS80/384_ICES-1	Ice sample	9/28/2012	core in refrozen meltpond 1 surface	Thermistor Buoy
PS80/384-1	84.37483	17.45367	PS80/384_ICES-2	Ice sample	9/28/2012	core in refrozen meltpond 2 surface	trace metal clean and biology meltpond sampling

Event	Latitude	Longitude	Label	Device	Date	Comment 1	Comment 2
PS80/384-1	84.37483	17.45367	PS80/384_ICES-3	Ice sample	9/28/2012	core in refrozen meltpond 3 surface	trace metal clean and biology meltpond sampling
PS80/384-1	84.37483	17.45367	PS80/384_ICES-4	Ice sample	9/28/2012	core in new sea ice	trace metal clean and biology meltpond sampling
PS80/384-1	84.37483	17.45367	PS80/384_ICES-5	Ice sample		Scattering Sample #7	trace metal clean and biology meltpond sampling
PS80/384-1	84.37483	17.45367	PS80/384_KB-1	Kemmere bottle	9/29/2012	Water under the ice (3 depths)	trace metal clean and biology meltpond sampling
PS80/384-1	84.37483	17.45367	PS80/384_MSS-1	Microstructure Profiler for Ocean turbulance measurements	9/29/2012	BioGeo MSS Profile 1	trace metal clean and biology meltpond sampling
PS80/384-1	84.37483	17.45367	PS80/384_MSS-10	Microstructure Profiler for Ocean turbulance measurements	9/29/2012	BioGeo MSS Profile 10	trace metal clean and biology water sampling
PS80/384-1	84.37483	17.45367	PS80/384_MSS-11	Microstructure Profiler for Ocean turbulance measurements	9/29/2012	BioGeo MSS Profile 11	trace metal clean and biology water sampling
PS80/384-1	84.37483	17.45367	PS80/384_MSS-12	Microstructure Profiler for Ocean turbulance measurements	9/29/2012	BioGeo MSS Profile 12	trace metal clean and biology water sampling
PS80/384-1	84.37483	17.45367	PS80/384_MSS-13	Microstructure Profiler for Ocean turbulance measurements	9/29/2012	BioGeo MSS Profile 13	trace metal clean and biology water sampling
PS80/384-1	84.37483	17.45367	PS80/384_MSS-2	Microstructure Profiler for Ocean turbulance measurements	9/29/2012	BioGeo MSS Profile 2	trace metal clean and biology water sampling
PS80/384-1	84.37483	17.45367	PS80/384_MSS-3	Microstructure Profiler for Ocean turbulance measurements	9/29/2012	BioGeo MSS Profile 3	trace metal clean and biology water sampling

Event	Latitude	Longitude	Label	Device	Date	Comment 1	Comment 2
PS80/384-1	84.37483	17.45367	PS80/384_MSS-4	Microstructure Profiler for Ocean turbulance measurements	9/29/2012	BioGeo MSS Profile 4	trace metal clean water sampling
PS80/384-1	84.37483	17.45367	PS80/384_MSS-5	Microstructure Profiler for Ocean turbulance measurements	9/29/2012	BioGeo MSS Profile 5	Under Ice water sample
PS80/384-1	84.37483	17.45367	PS80/384_MSS-6	Microstructure Profiler for Ocean turbulance measurements	9/29/2012	BioGeo MSS Profile 6	Under Ice water sample
PS80/384-1	84.37483	17.45367	PS80/384_MSS-7	Microstructure Profiler for Ocean turbulance measurements	9/29/2012	BioGeo MSS Profile 7	Under Ice water sample
PS80/384-1	84.37483	17.45367	PS80/384_MSS-8	Microstructure Profiler for Ocean turbulance measurements	9/29/2012	BioGeo MSS Profile 8	Under Ice water sample
PS80/384-1	84.37483	17.45367	PS80/384_MSS-9	Microstructure Profiler for Ocean turbulance measurements	9/29/2012	BioGeo MSS Profile 9	Under Ice water sample
PS80/384-1	84.37483	17.45367	PS80/384_RCM	Current meter, Aanderaa	9/28/2012	BioGeo Seaguard	Under Ice water sample
PS80/384-1	84.37483	17.45367	PS80/384_ROV	Remote operated vehicle	9/9/2012	ROV USBL	Under Ice water sample
PS80/384-1	84.37483	17.45367	PS80/384_SNOWS-1	Snow sample	9/29/2012	Snow sampling	Under Ice water sample
PS80/384-1	84.37483	17.45367	PS80/384_TRAPSIF	Trap, sediment ice float	9/28/2012	Sediment Trap	Water under the ice (3 depths)

Table A2: Metadata overview Sea Ice Biogeochemistry

Station - Pangaea ID	Descript-ion	Abbreviation Description	Comments
PS80/3_224-1	Ice station 1		
PS80/3_224-1_CTD_ under-ice_moored			CTD, O2, PAR at 30 sec intervals
PS80/3_224-1_ADCP_ under-ice_moored			0.10 m bin size, 0.2-8.0 metres below ice
PS80/3_224-1_Eddy-1_Under-ice O2_Profil1		Eddy correlation system	
PS80/3_224-1_Eddy-1_Under-ice O2_Profil2		Eddy correlation system	Rotated instrument into direction of flow (i.e. -ve X). Amp 2 seems OK but very high fluxes possibly due to debris getting stuck on sensors
PS80/3_224-1_Eddy-2_Under-ice O2_ Conductivity		Eddy correlation system	
PS80/3_224-1_MSS_ Profile 1		Microstructure Profiler for Ocean turbulence measurements	Test profile with the MSS microstructure. 2 X Shear, fast temp, O2, CTD, TUR, ACC
PS80/3_224-1_MSS_ Profile 2		Microstructure Profiler for Ocean turbulence measurements	
PS80/3_224-1_RCM _Under-ice moored		Recording current meter with O2, T, Sal, Pressure, Turbitidy	Current speed and direction, O2, T, Pressure, Salinity
PS80/3_224-1_RCM _Under-ice moored_ longterm		Recording current meter with O2, T, Sal, Pressure, Turbitidy	Current speed and direction, O2, T, Pressure, Salinity
PS80/3_224-1_MICP_ Pond		Microprofiler	O2, pH, T, Conductivity
PS80/3_224-1_IMB_ long-term-1		Ice Mass Balance	long term sea ice temperature profiles
PS80/3_224-1_IMB_ long-term-2		Ice Mass Balance	long term sea ice temperature profiles
PS80/3_224-1_ SEAICEC_BGC-1		Sea Ice core	Alkalinity, DIC, Bulk O2
PS80/3_224-1_ SEAICEC_IKA		Sea Ice core	Ilkaite (collaboration with Søren Rysgaard)
PS80/3_224-1_ SEAICEC_Nit-1		Sea Ice core	Denitrification and Anammox in sea ice
PS80/3_224-1_ SEAICEC_Nit-2		Sea Ice core	Nitrification and N2 Fixation in sea ice
PS80/3_224-1_MP-2_ N2 Fixation		Melt Pond-2	

Station - Pangaea ID	Descript-ion	Abbreviation Description	Comments
PS80/3_237-1	Ice station 2		
PS80/3_237-1_CTD_ Under-ice moored			CTD, O2, PAR at 30 sec intervals
PS80/3_237-1_ADCP_ Under-ice moored			0.10 m bin size, 0.2-8.0 metres below ice
PS80/3_237-1_Eddy-1_Under-ice Eddy O2_ Profile1		Eddy correlation system	Low magnitudes <2cm s-1
PS80/3_237-1_Eddy-1_Under-ice Eddy O2_ Profile2		Eddy correlation system	
PS80/3_237-1_Eddy-1_Under-ice Eddy O2_ Profile3		Eddy correlation system	Low magnitudes 1-1.5 cm s-1 but nice fluxes and spectra
PS80/3_237-1_Eddy-1_Under-ice Eddy O2_ Profile4		Eddy correlation system	High fluxes round 30mmol m-2 from amp 2; spectra look good
PS80/3_237-1_Eddy-2_ Under-ice Eddy Temp_ Conductivity_Profile1		Eddy correlation system	
PS80/3_237-1_Eddy-2_ Under-ice Eddy Temp_ Conductivity_Profile2		Eddy correlation system	
PS80/3_237-1_MSS_ Profile 1		Microstructure Profiler for Ocean turbulence measurements	2 X Shear, fast temp, O2, CTD, TUR, ACC
PS80/3_237-1_MSS_ Profile 2		Microstructure Profiler for Ocean turbulence measurements	
PS80/3_237-1_MSS_ Profile 3		Microstructure Profiler for Ocean turbulence measurements	
PS80/3_237-1_MSS_ Profile 4		Microstructure Profiler for Ocean turbulence measurements	
PS80/3_237-1_MSS_ Profile 5		Microstructure Profiler for Ocean turbulence measurements	
PS80/3_237-1_MSS_ Profile 6		Microstructure Profiler for Ocean turbulence measurements	
PS80/3_237-1_RCM _Under-ice moored		Recording current meter with O2, T, Sal, Pressure, Turbitidy	Current speed and direction, O2, T, Pressure, Salinity

Station - Pangaea ID	Descript-ion	Abbreviation Description	Comments
PS80/3_237-1_ SEAICEC_BGC-1		Sea Ice core	Alkalinity, DIC, Bulk O2
PS80/3_237-1_ SEAICEC_IKA-1		Sea Ice core	Ilkaite (collaboration with Søren Rysgaard)
PS80/3_237-1_MP1_N2 Fixation		Melt Pond 1	
PS80/3_237-1_SF_N2 Fixation		Surface Water	These measurements are relation to Mar's nutrient experiments
PS80/3_255-1	Ice station 3		
PS80/3_255-1_CTD_ Under-ice moored			CTD, O2, PAR at 30 sec intervals
PS80/3_255-1_ADCP_ Under-ice moored			0.10 m bin size, 0.2-8.0 metres below ice
PS80/3_255-1_Eddy-1_ Under-ice Eddy Temp_ Conductivity_Profile1		Eddy correlation system	
PS80/3_255-1_Eddy-1_ Under-ice Eddy Temp_ Conductivity_Profile2		Eddy correlation system	
PS80/3_255-1_Eddy-2_Under-ice Eddy O2_ Profile1		Eddy correlation system	Magnitudes 4-15 cm s-1, nice spectra, very high fluxes (>50 mmol/m2)
PS80/3_255-1_Eddy-2_Under-ice Eddy O2_ Profile2		Eddy correlation system	
PS80/3_255-1_MSS_ Profile1		Microstructure Profiler for Ocean turbulence measurements	2 X Shear, fast temp, O2, CTD, TUR, ACC
PS80/3_255-1_MSS_ Profile2		Microstructure Profiler for Ocean turbulence measurements	
PS80/3_255-1_MSS_ Profile3		Microstructure Profiler for Ocean turbulence measurements	
PS80/3_255-1_MSS_ Profile4		Microstructure Profiler for Ocean turbulence measurements	
PS80/3_255-1_MSS_ Profile5		Microstructure Profiler for Ocean turbulence measurements	
PS80/3_255-1_MSS_ Profile6		Microstructure Profiler for Ocean turbulence measurements	

Station - Pangaea ID	Descript-ion	Abbreviation Description	Comments
PS80/3_255-1_RCM _Under-ice moored		Recording current meter with O2, T, Sal, Pressure, Turbitidy	Current speed and direction, O2, T, Pressure, Salinity
PS80/3_255-1_UIP_		Under Ice Microprofiler	O2, Salinity, T
PS80/3_255-1_ SEAICEC_BGC-1		Sea Ice core	Alkalinity, DIC, Bulk O2
PS80/3_255-1_ SEAICEC_IKA		Sea Ice core	Ilkaite (collaboration with Søren Rysgaard)
PS80/3_277-1	Ice Station 4		
PS80/3_277-1_ADCP_ Under-ice moored			0.10 m bin size, 0.2-8.0 metres below ice
PS80/3_277-1_CTD_ Under-ice moored			CTD, O2, PAR at 30 sec intervals
PS80/3_277-1_Eddy-2_ Under-ice Eddy Temp_ Conductivity_Profile1		Eddy correlation system	
PS80/3_277-1_Eddy-2_ Under-ice Eddy Temp_ Conductivity_Profile2		Eddy correlation system	
PS80/3_277-1_Eddy-1_Under-ice Eddy O2_ Profile1		Eddy correlation system	
PS80/3_277-1_Eddy-1_Under-ice Eddy O2_ Profile2		Eddy correlation system	
PS80/3_277-1_MSS_ Profile1		Microstructure Profiler for Ocean turbulence measurements	2 X Shear, fast temp, O2, CTD, TUR, ACC
PS80/3_277-1_MSS_ Profile2		Microstructure Profiler for Ocean turbulence measurements	
PS80/3_277-1_MSS_ Profile3		Microstructure Profiler for Ocean turbulence measurements	
PS80/3_277-1_MSS_ Profile4		Microstructure Profiler for Ocean turbulence measurements	
PS80/3_277-1_MSS_ Profile5		Microstructure Profiler for Ocean turbulence measurements	

Station - Pangaea ID	Descript-ion	Abbreviation Description	Comments
PS80/3_277-1_MSS_ Profile6		Microstructure Profiler for Ocean turbulence measurements	
PS80/3_277-1_MSS_ Profile7		Microstructure Profiler for Ocean turbulence measurements	
PS80/3_277-1_RCM _Under-ice moored		Recording current meter with O2, T, Sal, Pressure, Turbitidy	Current speed and direction, O2, T, Pressure, Salinity
PS80/3_277-1_UIP_		Under Ice Microprofiler	O2, Salinity, T
PS80/3_277-1_ SEAICEC_BGC-1		Sae Ice Core	Alkalinity, DIC, Bulk O2
PS80/3_277-1_ SEAICEC_IKA		Sae Ice Core	Ilkaite (collaboration with Søren Rysgaard)
PS80/3_323-1	Ice Station 5		
PS80/3_323-1_ADCP_ Under-ice moored			0.10 m bin size, 0.2-8.0 metres below ice
PS80/3_323-1_CTD_ Under-ice moored			CTD, O2, PAR at 30 sec intervals
PS80/3_323-1_Eddy-2_ Under-ice Eddy Temp_ Conductivity_Profile1		Eddy correlation system	
PS80/3_323-1_Eddy-2_ Under-ice Eddy Temp_ Conductivity_Profile2		Eddy correlation system	
PS80/3_323-1_Eddy-1_Under-ice Eddy O2_ Profile1		Eddy correlation system	
PS80/3_323-1_MSS_ Profile1		Microstructure Profiler for Ocean turbulence measurements	
PS80/3_323-1_MSS_ Profile2		Microstructure Profiler for Ocean turbulence measurements	
PS80/3_323-1_MSS_ Profile3		Microstructure Profiler for Ocean turbulence measurements	
PS80/3_323-1_MSS_ Profile4		Microstructure Profiler for Ocean turbulence measurements	

Station - Pangaea ID	Descript-ion	Abbreviation Description	Comments
PS80/3_323-1_MSS_ Profile5		Microstructure Profiler for Ocean turbulence measurements	
PS80/3_323-1_MSS_ Profile6		Microstructure Profiler for Ocean turbulence measurements	
PS80/3_323-1_RCM _Under-ice moored		Recording current meter with O2, T, Sal, Pressure, Turbitidy	Current speed and direction, O2, T, Pressure, Salinity
PS80/3_323-1_UIP_		Under-ice microprofiler	O2, Salinity, T
PS80/3_323-1_ SEAICEC_BGC-1		Sea Ice Core	Alkalinity, DIC, Bulk O2
PS80/3_323-1_ SEAICEC_IKA		Sea Ice Core	Ilkaite (collaboration with Søren Rysgaard)
PS80/3_323-1_MP1_N2 fixation		Melt Pond 1	N2 fixation in white aggregates from melt pond
PS80/3_335-1	Ice Station 6		
PS80/3_335-1_ADCP_ Under-ice moored			0.10 m bin size, 0.2-8.0 metres below ice
PS80/3_335-1_CTD_ Under-ice moored			CTD, O2, PAR at 30 sec intervals
PS80/3_335-1_Eddy-2_Under-ice Eddy O2_ Conductivity_Profile2		Eddy Correlation system	
PS80/3_335-1_Eddy-1_Under-ice Eddy O2_ Profile1		Eddy Correlation system	
PS80/3_335-1_Eddy-1_Under-ice Eddy O2_ Profile2		Eddy Correlation system	
PS80/3_335-1_MSS_ Profile1		Microstructure Profiler for Ocean turbulence measurements	
PS80/3_335-1_MSS_ Profile2		Microstructure Profiler for Ocean turbulence measurements	
PS80/3_335-1_MSS_ Profile3		Microstructure Profiler for Ocean turbulence measurements	

Station - Pangaea ID	Descript-ion	Abbreviation Description	Comments
PS80/3_335-1_MSS_ Profile4		Microstructure Profiler for Ocean turbulence measurements	
PS80/3_335-1_MSS_ Profile5		Microstructure Profiler for Ocean turbulence measurements	
PS80/3_335-1_MSS_ Profile6		Microstructure Profiler for Ocean turbulence measurements	
PS80/3_335-1_RCM _Under-ice moored		Recording current meter with O2, T, Sal, Pressure, Turbitidy	Current speed and direction, O2, T, Pressure, Salinity
PS80/3_335-1_UIP_		Under-ice microprofiler	O2, Salinity, T
PS80/3_335-1_IMB_ long-term		Ice Mass Balance	long term sea ice temperature profiles
PS80/3_335-1_ SEAICEC_BGC-1		Sea Ice Core	Alkalinity, DIC, Bulk O2
PS80/3_335-1_ SEAICEC_IKA		Sea Ice Core	Ilkaite (collaboration with Søren Rysgaard)
PS80/3_356-1	Ice Station 7		
PS80/3_356-1_ADCP_ Under-ice moored			0.10 m bin size, 0.2-8.0 metres below ice
PS80/3_356-1_CTD_ Under-ice moored			CTD, O2, PAR at 30 sec intervals
PS80/3_356-1_Eddy-2_Under-ice Eddy O2_ Conductivity_Profile1		Eddy Correlation system	
PS80/3_356-1_Eddy-1_Under-ice Eddy O2_ Profile1		Eddy Correlation system	
PS80/3_356-1_MSS_ Profile1		Microstructure Profiler for Ocean turbulence measurements	
PS80/3_356-1_MSS_ Profile2		Microstructure Profiler for Ocean turbulence measurements	
PS80/3_356-1_MSS_ Profile3		Microstructure Profiler for Ocean turbulence measurements	

Station - Pangaea ID	Descript-ion	Abbreviation Description	Comments
PS80/3_356-1_MSS_ Profile4		Microstructure Profiler for Ocean turbulence measurements	
PS80/3_356-1_MSS_ Profile5		Microstructure Profiler for Ocean turbulence measurements	
PS80/3_356-1_MSS_ Profile6		Microstructure Profiler for Ocean turbulence measurements	
PS80/3_356-1_MSS_ Profile7		Microstructure Profiler for Ocean turbulence measurements	
PS80/3_356-1_MSS_ Profile8		Microstructure Profiler for Ocean turbulence measurements	
PS80/3_356-1_RCM _Under-ice moored		Recording current meter with O2, T, Sal, Pressure, Turbitidy	Current speed and direction, O2, T, Pressure, Salinity
PS80/3_356-1_UIP_		Under-ice microprofiler	O2, Salinity, T
PS80/3_356-1_ SEAICEC_BGC-1		Sea Ice Core	Alkalinity, DIC, Bulk O2
PS80/3_356-1_ SEAICEC_IKA		Sea Ice Core	Ilkaite (collaboration with Søren Rysgaard)
PS80/3_356-1_MP1_ Oxygen and Nitrogen dynamics		Melt Pond 1	Collaboration project with Mar, Judith, JP, Frank and Karel(Measurements: Oxygen dynamics, nitrogen dymanics, PP, BP, enzyme activity, Nutrients)
PS80/3_369-1	Ice Station 8		
PS80/3_369-1_ADCP_ Under-ice moored			0.10 m bin size, 0.2-8.0 metres below ice
PS80/3_369-1_CTD_ Under-ice moored			CTD, O2, PAR at 30 sec intervals
PS80/3_369-1_Eddy-2_Under-ice Eddy O2_ Conductivity_Profile1		Eddy Correlation system	
PS80/3_369-1_Eddy-1_Under-ice Eddy O2_ Profile1		Eddy Correlation system	
PS80/3_369-1_MSS_ Profile1		Microstructure Profiler for Ocean turbulence measurements	

Station - Pangaea ID	Descript-ion	Abbreviation Description	Comments
PS80/3_369-1_MSS_ Profile2		Microstructure Profiler for Ocean turbulence measurements	
PS80/3_369-1_MSS_ Profile3		Microstructure Profiler for Ocean turbulence measurements	
PS80/3_369-1_MSS_ Profile4		Microstructure Profiler for Ocean turbulence measurements	
PS80/3_369-1_MSS_ Profile5		Microstructure Profiler for Ocean turbulence measurements	
PS80/3_369-1_MSS_ Profile6		Microstructure Profiler for Ocean turbulence measurements	
PS80/3_369-1_MSS_ Profile7		Microstructure Profiler for Ocean turbulence measurements	
PS80/3_369-1_MSS_ Profile8		Microstructure Profiler for Ocean turbulence measurements	
PS80/3_369-1_MSS_ Profile9		Microstructure Profiler for Ocean turbulence measurements	
PS80/3_369-1_MSS_ Profile10		Microstructure Profiler for Ocean turbulence measurements	
PS80/3_369-1_MSS_ Profile11		Microstructure Profiler for Ocean turbulence measurements	
PS80/3_369-1_MSS_ Profile12		Microstructure Profiler for Ocean turbulence measurements	
PS80/3_369-1_MSS_ Profile13		Microstructure Profiler for Ocean turbulence measurements	
PS80/3_369-1_MSS_ Profile14		Microstructure Profiler for Ocean turbulence measurements	

Station - Pangaea ID	Descript-ion	Abbreviation Description	Comments
PS80/3_369-1_MSS_ Profile15		Microstructure Profiler for Ocean turbulence measurements	
PS80/3_369-1_MSS_ Profile16		Microstructure Profiler for Ocean turbulence measurements	
PS80/3_369-1_MSS_ Profile17		Microstructure Profiler for Ocean turbulence measurements	
PS80/3_369-1_MSS_ Profile18		Microstructure Profiler for Ocean turbulence measurements	
PS80/3_369-1_MSS_ Profile19		Microstructure Profiler for Ocean turbulence measurements	
PS80/3_369-1_MSS_ Profile20		Microstructure Profiler for Ocean turbulence measurements	
PS80/3_369-1_MSS_ Profile21		Microstructure Profiler for Ocean turbulence measurements	
PS80/3_369-1_MSS_ Profile22		Microstructure Profiler for Ocean turbulence measurements	
PS80/3_369-1_MSS_ Profile23		Microstructure Profiler for Ocean turbulence measurements	
PS80/3_369-1_MSS_ Profile24		Microstructure Profiler for Ocean turbulence measurements	
PS80/3_369-1_MSS_ Profile25		Microstructure Profiler for Ocean turbulence measurements	
PS80/3_369-1_MSS_ Profile26		Microstructure Profiler for Ocean turbulence measurements	
PS80/3_369-1_MSS_ Profile27		Microstructure Profiler for Ocean turbulence measurements	

Station - Pangaea ID	Descript-ion	Abbreviation Description	Comments
PS80/3_369-1_MSS_ Profile28		Microstructure Profiler for Ocean turbulence measurements	
PS80/3_369-1_RCM _Under-ice moored		Recording current meter with O2, T, Sal, Pressure, Turbitidy	Current speed and direction, O2, T, Pressure, Salinity
PS80/3_369-1_UIP_		Under-ice microprofiler	O2, Salinity, T
PS80/3_369-1_ SEAICEC_BGC-1		Sea Ice Core	Alkalinity, DIC, Bulk O2
PS80/3_369-1_ SEAICEC_IKA		Sea Ice Core	Ilkaite (collaboration with Søren Rysgaard)
PS80/3_84-1	Ice station 9		
PS80/3_84-1_ADCP_ Under-ice moored			0.10 m bin size, 0.2-8.0 metres below ice
PS80/3_84-1_CTD_ Under-ice moored			CTD, O2, PAR at 30 sec intervals
PS80/3_84-1_Eddy-2_Under-ice Eddy O2_ Conductivity_Profile1		Eddy Correlation system	
PS80/3_84-1_Eddy-1_Under-ice Eddy O2_ Profile1		Eddy Correlation system	
PS80/3_84-1_MSS_ Profile1		Microstructure Profiler for Ocean turbulence measurements	
PS80/3_84-1_MSS_ Profile2		Microstructure Profiler for Ocean turbulence measurements	
PS80/3_84-1_MSS_ Profile3		Microstructure Profiler for Ocean turbulence measurements	
PS80/3_84-1_MSS_ Profile4		Microstructure Profiler for Ocean turbulence measurements	
PS80/3_84-1_MSS_ Profile5		Microstructure Profiler for Ocean turbulence measurements	
PS80/3_84-1_MSS_ Profile6		Microstructure Profiler for Ocean turbulence measurements	

Station - Pangaea ID	**Descript-ion**	**Abbreviation Description**	**Comments**
PS80/3_84-1_MSS_ Profile7		Microstructure Profiler for Ocean turbulence measurements	
PS80/3_84-1_MSS_ Profile8		Microstructure Profiler for Ocean turbulence measurements	
PS80/3_84-1_MSS_ Profile9		Microstructure Profiler for Ocean turbulence measurements	
PS80/3_84-1_MSS_ Profile10		Microstructure Profiler for Ocean turbulence measurements	
PS80/3_84-1_MSS_ Profile11		Microstructure Profiler for Ocean turbulence measurements	
PS80/3_84-1_MSS_ Profile12		Microstructure Profiler for Ocean turbulence measurements	
PS80/3_84-1_MSS_ Profile13		Microstructure Profiler for Ocean turbulence measurements	
PS80/3_84-1_RCM _Under-ice moored		Recording current meter with O2, T, Sal, Pressure, Turbitidy	Current speed and direction, O2, T, Pressure, Salinity
PS80/3_84-1_ SEAICEC_BGC-1		Sea Ice Core	Alkalinity, DIC, Bulk O2

Table A3: Summary of OFOS and Agassiz trawl stations

Ice station	Location	OFOS					AGT		
		Station Nr	Number of taken pictures	Depth (start-end), m	Dominant megafauna (abundance)	Dominant megafauna (biomass)	Station Nr	Depth, m	Remarks
test station	Barents sea	PS80-0206	450	417,5 - 468,7	Not calculated	Not calculated	PS80/205-1	615,2 - 628,0	Good catch, mainly Demospongiae and ophiuroids
1	Nansen Basin	PS80-0228	640	4010,1 - 4011,3	Isopoda, Actiniaria	*Kolga hyalina*, *Pourtalesia jeffreysi*, Porifera, Actiniaria	PS80/222-1	4012,0 - 4013,0	Good catch consisting mainly of *Kolga hyalina* and actiniarians. Also found dumbo octopus, bivalvs and polychaets
2	Nansen Basin	PS80-0239	225	3477,3 - 3468,7	Actiniaria, *Ophiostriatus striatus*	Actiniaria, *Ophiostriatus striatus*, *Elpidia heckeri*	PS80/249-1	3469,9 - 3469,5	Poor catch, few *Elpidia heckeri,* ophiuroids and crustaceans
							PS80/249-2	3471,2 - 3473,1	Good catch of ophiuroids, actiniarians and *Elpidia heckeri;* one crinoid stalk
3	Nansen Basin, close to Gakkel Ridge	PS80-0257	715	3571,6 - 3575,3	Actiniaria, Serpulidae, *Kolga hyalina*, *Ophiostriatus striatus*	*Kolga hyalina*, Actiniaria, Porifera	PS80/259-1	3575,1 - 3575,7	Good catch of *Kolga hyalina, Elpidia heckeri,* actiniarians and ophiuroids; also one asteroid was found

Ice station	Location	OFOS					AGT		
		Station Nr	Number of taken pictures	Depth (start-end), m	Dominant megafauna (abundance)	Dominant megafauna (biomass)	Station Nr	Depth, m	Remarks
4	Amundsen Basin near Gakkel Ridge	PS80-0282	790	4168 - 4172,2	Isopoda, Actiniaria, Serpulidae, Amphipoda	Actiniaria, *Kolga hyalina*, Porifera	PS80/286-1	4157,5 - 4159,2	Good catch: mainly dead hexactinellid stalks, many *Kolga hyalina*, also *Elpidia heckeri*, Actiniaria, Pycnogonida etc.
5	Amundsen Basin	PS80-0327	740	4041,7 - 4032,9	Actiniaria, Isopoda, Serpulidae	Actiniaria, *Kolga hyalina*, Ceriantharia, *Elpidia heckeri*	PS80/332-1	4037,7 - 4039,2	Good catch: mainly dead hexactinellid stalks, many *Kolga hyalina*, some *Elpidia heckeri*, Actiniaria, pycnogonida etc.
6	Amundsen Basin	PS80-0340	1160	4351,1 - 4354,4	*Kolga hyalina*, *Elpidia heckeri*, Isopoda	*Kolga hyalina*, *Elpidia heckeri*, Actiniaria	PS80/346-1	4352,8 - 4354,2	Good catch: mainly dead hexactinellid stalks, *Kolga hyalina*, *Elpidia heckeri*, Actiniaria, Pycnogonida
7	Amundsen Basin	PS80-0356	420	4384,3 - 4382,8	*Elpidia heckeri*, Isopoda	*Elpidia heckeri*	PS80/359-1	4380,4 - 4379,8	Poor catch: some dead hexactinellid stalks, few *Kolga hyalina* and *Elpidia heckeri*

Ice station	Location	OFOS					AGT		
		Station Nr	Number of taken pictures	Depth (start-end), m	Dominant megafauna (abundance)	Dominant megafauna (biomass)	Station Nr	Depth, m	Remarks
8	Amundsen Basin	PS80-0369	460	4375,0 - 4375,0	Isopoda, Actiniaria, Ceriantharia	*Kolga hyalina*, Ceriantharia, Actiniaria	No trawl station due to ice condition		
9	Nansen Basin, close to the Gakkel Ridge	PS80-0392	270	4048,9-4066,6	*Elpidia heckeri*	*Elpidia heckeri*	No trawl station due to ice condition		

Table A4: Summary of Meio- and Macrofauna samples

Station	Date	Time	Gear	Action	Position Lat	Position Lon	Water depth [m]
PS80/207-3	06.08.12	00:25	TVMUC	on ground/max depth	81° 27.12' N	31° 13.25' E	391,5
PS80/221-1	08.08.12	11:22	LANDER	in the water	84° 0.03' N	30° 4.44' E	4011,0
PS80/221-2	08.08.12	14:03	LANDER	in the water	83° 59.92' N	29° 52.61' E	4016,4
PS80/221-3	08.08.12	17:05	LANDER	in the water	83° 59.75' N	29° 44.46' E	4013,3
PS80/225-1	09.08.12	10:35	TVMUC	on ground/max depth	84° 2.76' N	31° 12.26' E	4019,2
PS80/225-2	09.08.12	13:51	TVMUC	on ground/max depth	84° 2.11' N	31° 14.80' E	4010,4
PS80/229-2	10.08.12	16:25	MG	on ground/max depth	83° 59.83' N	31° 19.07' E	4008,3
PS80/236-1	14.08.12	05:27	LANDER	in the water	83° 55.39' N	78° 18.03' E	3469,9
PS80/236-3	14.08.12	10:26	LANDER	in the water	83° 55.35' N	78° 41.87' E	3465,8
PS80/240-1	15.08.12	07:50	TVMUC	on ground/max depth	83° 56.82' N	76° 53.06' E	4807,7
PS80/241-1	15.08.12	14:50	MG	on ground/max depth	83° 55.94' N	76° 42.68' E	3431,8
PS80/251-3	19.08.12	14:01	LANDER	in the water	82° 38.19' N	108° 52.05' E	3604,7
PS80/260-2	21.08.12	10:35	TVMUC	on ground/max depth	82° 53.99' N	109° 48.81' E	3590,5
PS80/262-2	21.08.12	20:32	MG	on ground/max depth	82° 58.57' N	109° 55.12' E	3601,4
PS80/277-3	25.08.12	16:46	TVMUC	on ground/max depth	82° 53.46' N	129° 54.70' E	4166,1
PS80/278-1	25.08.12	14:10	MG	on ground/max depth	82° 52.96' N	129° 57.29' E	4166,9
PS80/290-2	28.08.12	13:50	LANDER	in the water	79° 40.87' N	130° 35.58' E	3400,9
PS80/290-3	28.08.12	15:36	LANDER	in the water	79° 39.86' N	130° 35.09' E	3398,4
PS80/292-1	28.08.12	21:22	TVMUC	on ground/max depth	79° 38.94' N	130° 35.40' E	3387,4
PS80/296-1	29.08.12	16:32	TVMUC	on ground/max depth	78° 23.37' N	133° 12.30' E	1986,4
PS80/299-1	29.08.12	23:16	TVMUC	on ground/max depth	78° 8.17' N	133° 19.95' E	786,6
PS80/302-1	30.08.12	12:52	TVMUC	on ground/max depth	77° 58.28' N	136° 58.06' E	67,7
PS80/309-1	01.09.12	10:42	TVMUC	on ground/max depth	77° 10.15' N	114° 54.96' E	70,1
PS80/310-1	01.09.12	15:51	TVMUC	on ground/max depth	77° 15.15' N	118° 33.25' E	24,2
PS80/312-1	01.09.12	19:05	TVMUC	off ground	77° 23.80' N	118° 11.63' E	528,7
PS80/313-1	01.09.12	22:11	TVMUC	on ground/max depth	77° 40.82' N	118° 34.30' E	1489,0
PS80/318-1	02.09.12	13:12	TVMUC	on ground/max depth	78° 40.05' N	118° 44.30' E	2569,8
PS80/320-1	02.09.12	20:39	TVMUC	on ground/max depth	79° 9.70' N	119° 47.02' E	3003,2

Station	Date	Time	Gear	Action	Position Lat	Position Lon	Water depth [m]
PS80/326-1	04.09.12	16:15	MG	on ground/max depth	81° 55.62' N	130° 55.00' E	4038,1
PS80/330-1	05.09.12	13:03	TVMUC	on ground/max depth	81° 52.57' N	130° 51.53' E	4034,1
PS80/334-1	07.09.12	00:15	LANDER	in the water	85° 9.79' N	123° 0.02' E	4355,6
PS80/334-2	07.09.12	02:16	LANDER	in the water	85° 8.94' N	123° 10.16' E	4353,8
PS80/334-3	07.09.12	04:05	LANDER	in the water	85° 7.92' N	123° 9.16' E	4355,9
PS80/338-1	07.09.12	14:51	TVMUC	on ground/max depth	85° 5.58' N	122° 21.73' E	4357,1
PS80/339-1	08.09.12	08:49	MG	on ground/max depth	85° 3.44' N	122° 44.17' E	4351,8
PS80/350-1	18.09.12	11:25	TVMUC	on ground/max depth	87° 56.00' N	61° 9.47' E	4380,8
PS80/355-1	19.09.12	06:48	MG	on ground/max depth	87° 55.61' N	61° 0.73' E	4380,7
PS80/361-1	22.09.12	07:45	TVMUC	on ground/max depth	88° 49.60' N	58° 37.64' E	4373,1
PS80/363-1	22.09.12	14:31	TVMUC	on ground/max depth	88° 48.84' N	57° 38.25' E	4375,0
PS80/371-1	23.09.12	13:19	LANDER	on ground/max depth	88° 45.77' N	55° 40.39' E	4369,1
PS80/394-2	29.09.12	13:14	TVMUC	on ground/max depth	84° 20.78' N	17° 48.16' E	4024,2

Table A5: Multicorer stations during ARK-XXVII/3

Gear	Date	Station	Site/Area	Latitude	Longitude	Depth (m)	Cores retrieved	Comment
TV-MUC	5.8.2012	PS80/207-1	Test station	81°27.20' N	31°13.56' E	400.2	0	no Posidonia, ships position
TV-MUC	5.8.2012	PS80/207-2	Test station	81°27.13' N	31°13.25' E	392.2	5	no Posidonia, ships position
TV-MUC	6.8.2012	PS80/207-3	Test station	81°27.12' N	31°13.25' E	391.5	7	no Posidonia, ships position
TV-MUC	8.9.2012	PS80/225-1	1st ice station	84° 02.839' N	31°11.558' E	4012	8	Posidonia position
TV-MUC	8.9.2012	PS80/225-2	1st ice station	84°01.998' N	31°14.678' E	4012	8	Posidonia position
TV-MUC	15.8.2012	PS80/240-1	2nd ice station	83°56.84' N	76°52.32' E	3450	8	no Posidonia, ships position
TV-MUC	16.8.2012	PS80/240-2	2nd ice station	83°57.03' N	76°48.31' E	3446	8	no Posidonia, ships position
MUC	16.8.2012	PS80/240-3	2nd ice station	83°56.61' N	76°43.76' E	3442	7	no Posidonia, ships position
TV-MUC	21.8.2012	PS80/260-1	3rd ice station	82°52.61' N	109°51.75' E	3588	8	no Posidonia, ships position
TV-MUC	21.8.2012	PS80/260-2	3rd ice station	82°54.01' N	109°48.78' E	3591	8	no Posidonia, ships position
TV-MUC	21.8.2012	PS80/260-3	3rd ice station	82°55.78' N	109°50.05' E	3595	8	no Posidonia, ships position
TV-MUC	25.8.2012	PS80/277-2	4th ice station	82°52.78' N	130°03.72' E	4165	6	no Posidonia, ships position
TV-MUC	26.8.2012	PS80/277-3	4th ice station	82°53.48' N	129°54.76' E	4167	5	no Posidonia, ships position
TV-MUC	27.8.2012	PS80/277-4	4th ice station	82°53.49' N	129°57.54' E	4166	6	no Posidonia, ships position
TV-MUC	29.8.2012	PS80/292-1	Laptev Sea	79°38.989' N	130°35.848' E	3437	8	Posidonia position
TV-MUC	29.8.2012	PS80/292-2	Laptev Sea	79°39.033'N	130°35.889' E	3390	7	Posidonia position
TV-MUC	29.8.2012	PS80/296	Laptev Sea	78°23.317' N	133°12.09' E	1976	8	Posidonia position
TV-MUC	29.8.2012	PS80/299	Laptev Sea	78°08.169' N	133°19.967' E	774	8	Posidonia position
TV-MUC	30.8.2012	PS80/302	Laptev Sea	77°58.279' N	136°58.061' E	57	8	no Posidonia, ships position
TV-MUC	1.9.2012	PS80/309	Laptev Sea	77°10.15' N	114°54.96' E	60	8	no Posidonia, ships position
TV-MUC	1.9.2012	PS80/310	Laptev Sea	77°15.118' N	118°33.271' E	193	8	no Posidonia, ships position
TV-MUC	1.9.2012	PS80/312	Laptev Sea	77°23.796' N	118°11.721	520	8	Posidonia position
TV-MUC	1.9.2012	PS80/313	Laptev Sea	77°40.805' N	118°34.406	1490	6	Posidonia position

Gear	Date	Station	Site/Area	Latitude	Longitude	Depth (m)	Cores retrieved	Comment
TV-MUC	2.9.2012	PS80/318	Laptev Sea	78°40.034' N	118°44.39' E	2596	7	Posidonia position
TV-MUC	2.9.2012	PS80/320	Laptev Sea	79°09.696' N	119°47.258' E	3005	5	Posidonia position
MUC	5.9.2012	PS80/330	5th ice station	81°52.578' N	130°51.528' E	4016	7	no Posidonia, no TV; ships position
TV-MUC	7.9.2012	PS80/338-1	6th ice station	85°05.636' N	122°20.199' E	4300	7	Posidonia position
TV-MUC	7.9.2012	PS80/338-2	6th ice station	85°05.154' N	122°29.434' E	4354	7	Posidonia position
TV-MUC	18.9.2012	PS80/350-1	7th ice station	87°56.003' N	61°10.175' E	4380	7	Posidonia position
TV-MUC	18.9.2012	PS80/350-2	7th ice station	87°55.92' N	61°2.572' E	4383	8	Posidonia position
TV-MUC	18.9.2012	PS80/350-3	7th ice station	87°55.972' N	60°59.23' E	4382	8	Posidonia position
TV-MUC	22.9.2012	PS80/361-1	8th ice station	88°49.605' N	58°37.651' E	4373	8	no Posidonia, ships position
TV-MUC	22.9.2012	PS80/362-1	8th ice station	88°49.22' N	58°13.59' E	4373	8	Posidonia position
TV-MUC	22.9.2012	PS80/363-1	8th ice station	88°48.872' N	57°44.301' E	4375	8	Posidonia position
TV-MUC	28.9.2012	PS80/3851	9th ice station	84°22.37' N	17°28.80' E	3616.7	0	Ships position
TV-MUC	29.9.2012	PS80/394-1	9th ice station	84°21.007' N	17°44.119' E	4023.2	8	Posidonia position
TV-MUC	29.9.2012	PS80/394-2	9th ice station	84°20.739' N	17°48.18' E	4024.2	7	Posidonia position

Table A6: Fixation of samples for microbiological and geochemical analyses

Method	Fixation/Storage
Sediment samples	
DNA extraction	-20°C
RNA extraction	-80°C, -20°C in RNA later
Cell counts	4% Formalin (AODC), PBS/Ethanol (FISH)
Total organic carbon	-20°C
Phospholipids	-20°C
Porosity	4°C
Chlorophyll pigments	-20°C, and direct measurements on board
Extracellular enzymatic activity (beta-glucosidase, chitobiase, aminopeptidase, esterase, trypsin 1, trypsin 2, chymotrypsin 1, chymotrypsin 2)	direct measurement on board
Extracellular enzymatic activity measurements using high-molecular weight polysaccharide substrates (pullulan, xylan, laminarin, fucoidan, arabinogalactan, chondroitin)	0°C incubations on board, time-series subsamples taken to be analysed using gel permeation chromatography at UNC Chapel Hill
Porewater samples	
Sulfate/Sulfide	4°C (in 2% Zinc acetate)
Nutrients	-20°C, for most stations 1 set was directly measured by K. Bakker
DIC	4°C, no headspace
Alkalinity	4°C, no headspace
Iron	4°C, in 1 M HCl
DOC (collaboration T. Dittmar, MPI)	-20°C

Station	Core	Core length (cm)	Distributed to	Methods
PS80/207-1	no cores retrieved			
PS80/207-2	1	28	C. Bienhold / A. Boetius (AWI/MPI)	pore water (Sulfate/Sulfide, Nutrients, DIC, Alkalinity, Iron)
	2	30	C. Bienhold / A. Boetius (AWI/MPI)	pore water (Sulfate/Sulfide, Nutrients, DIC, Alkalinity, Iron)
	3	36	C. Bienhold / A. Boetius (AWI/MPI)	Microbiology (DNA, RNA, AODC/FISH, TOC, Chlorophyll, Enzyme activity, porosity, phospholipids)
	4	35	C. Bienhold / A. Boetius (AWI/MPI)	Microbiology (DNA, RNA, AODC/FISH, TOC, Chlorophyll, Enzyme activity, porosity, phospholipids)
	5	25	C. Bienhold / A. Boetius (AWI/MPI)	Microbiology (DNA, RNA, AODC/FISH, TOC, Chlorophyll, Enzyme activity, porosity, phospholipids)
PS80/207-3	1	25	R. Degen (AWI) / P. Martinez Arbizu (Senckenberg)	Meiofauna
	2	25	R. Degen (AWI) / P. Martinez Arbizu (Senckenberg)	Meiofauna
	3	22	R. Degen (AWI) / P. Martinez Arbizu (Senckenberg)	Meiofauna
	4	25	X. Xiao / R. Stein (AWI)	Biomarker
	5	-	-	not sampled
	6	-	-	not sampled
	7	-	-	not sampled
PS80/225-1	1	25	C. Bienhold / A. Boetius (AWI/MPI)	pore water (Sulfate/Sulfide, Nutrients, DIC, Alkalinity, Iron)
	2	24	C. Bienhold / A. Boetius (AWI/MPI)	pore water (Sulfate/Sulfide, Nutrients, DIC, Alkalinity, Iron)
	3	35	C. Bienhold / A. Boetius (AWI/MPI)	Microbiology (DNA, RNA, AODC/FISH, TOC, Chlorophyll, Enzyme activity, porosity, phospholipids)
	4	33	C. Bienhold / A. Boetius (AWI/MPI)	Microbiology (DNA, RNA, AODC/FISH, TOC, Chlorophyll, Enzyme activity, porosity, phospholipids)
	5	29	C. Bienhold / A. Boetius (AWI/MPI)	Microbiology (DNA, RNA, AODC/FISH, TOC, Chlorophyll, Enzyme activity, porosity, phospholipids)

Station	Core	Core length (cm)	Distributed to	Methods
	6	19	R. Degen (AWI) / P. Martinez Arbizu (Senckenberg)	Meiofauna
	7	38	R. Degen (AWI) / P. Martinez Arbizu (Senckenberg)	Meiofauna
	8	26	R. Degen (AWI) / P. Martinez Arbizu (Senckenberg)	Meiofauna
PS80/225-2	1	34	JP Balmonte / C. Arnosti (UNC)	Enzyme activity
	2	39	JP Balmonte / C. Arnosti (UNC)	Enzyme activity
	3	40	JP Balmonte / C. Arnosti (UNC)	Enzyme activity
	4	25	JP Balmonte / C. Arnosti (UNC)	Enzyme activity
	5	33	X. Xiao / R. Stein (AWI)	Biomarker
	6	?	C. Bienhold / A. Boetius (MPI)	Backup
	7	37	V. Puigcorbe & M. Roca (UAB/ICTA), P. Masque (UAB)	Natural radionuclides
	8	38	R. Degen (AWI) / P. Martinez Arbizu (Senckenberg)	Meiofauna (EtOH)
PS80/240-1	1	-	C. Bienhold / A. Boetius (AWI/MPI)	pore water (Sulfate/Sulfide, Nutrients, DIC, Alkalinity, Iron); 1 set of nutrient samples to K. Bakker for direct measurement on board
	2	-	C. Bienhold / A. Boetius (AWI/MPI)	pore water (Sulfate/Sulfide, Nutrients, DIC, Alkalinity, Iron)
	3	35	C. Bienhold / A. Boetius (AWI/MPI)	Microbiology (DNA, RNA, AODC/FISH, TOC, Chlorophyll, Enzyme activity, porosity, phospholipids)
	4	34	C. Bienhold / A. Boetius (AWI/MPI)	Microbiology (DNA, RNA, AODC/FISH, TOC, Chlorophyll, Enzyme activity, porosity, phospholipids)
	5	37	C. Bienhold / A. Boetius (AWI/MPI)	Microbiology (DNA, RNA, AODC/FISH, TOC, Chlorophyll, Enzyme activity, porosity, phospholipids)
	6	37	R. Degen (AWI) / P. Martinez Arbizu (Senckenberg)	Meiofauna
	7	38	R. Degen (AWI) / P. Martinez Arbizu (Senckenberg)	Meiofauna

Station	Core	Core length (cm)	Distributed to	Methods
	8	-	R. Degen (AWI) / P. Martinez Arbizu (Senckenberg)	Meiofauna
PS80/240-2	1	-	C. Bienhold / A. Boetius (AWI/MPI)	pore water (DOC)
	2	-	C. Bienhold / A. Boetius (AWI/MPI)	pore water (DOC)
	3	-	C. Bienhold / A. Boetius (AWI/MPI)	pore water (DOC)
	4	-	C. Bienhold / A. Boetius (AWI/MPI)	pore water (DOC)
	5	35	C. Bienhold / A. Boetius (AWI/MPI)	Chlorophyll (0-1 cm)
	6	35	C. Bienhold / A. Boetius (AWI/MPI)	Chlorophyll (0-1 cm)
	7	39	C. Bienhold / A. Boetius (AWI/MPI)	Chlorophyll (0-1 cm)
	8		Backup MPI	
PS80/240-3	1	34	X. Xiao / R. Stein (AWI)	Biomarker
	2	32	JP Balmonte / C. Arnosti (UNC)	Enzyme activity
	3	31	JP Balmonte / C. Arnosti (UNC)	Enzyme activity
	4	26	JP Balmonte / C. Arnosti (UNC)	Enzyme activity
	5	32	JP Balmonte / C. Arnosti (UNC)	Enzyme activity
	6		V. Puigcorbe & M. Roca (UAB/ICTA), P. Masque (UAB)	Natural radionuclides
	7		C. Bienhold (AWI/MPI)	Isolation of bacteria
	8		-	water ran out, don't use
PS80/260-1	1		C. Bienhold / A. Boetius (AWI/MPI)	pore water (Sulfate/Sulfide, Nutrients, DIC, Alkalinity, Iron); 1 set of nutrient samples to K. Bakker for direct measurement on board
	2		C. Bienhold / A. Boetius (AWI/MPI)	pore water (Sulfate/Sulfide, Nutrients, DIC, Alkalinity, Iron)
	3		C. Bienhold / A. Boetius (AWI/MPI)	
	4	28	C. Bienhold / A. Boetius (AWI/MPI)	Microbiology (DNA, RNA, AODC/FISH, TOC, Chlorophyll, Enzyme activity, porosity, phospholipids)

Station	Core	Core length (cm)	Distributed to	Methods
	5	26	C. Bienhold / A. Boetius (AWI/MPI)	Microbiology (DNA, RNA, AODC/FISH, TOC, Chlorophyll, Enzyme activity, porosity, phospholipids)
	6	30	C. Bienhold / A. Boetius (AWI/MPI)	Microbiology (DNA, RNA, AODC/FISH, TOC, Chlorophyll, Enzyme activity, porosity, phospholipids)
	7		-	-
	8	27	V. Puigcorbe & M. Roca (UAB/ICTA), P. Masque (UAB)	Natural radionuclides
PS80/260-2	1		C. Bienhold / A. Boetius (AWI/MPI)	pore water (DOC)
	2		C. Bienhold / A. Boetius (AWI/MPI)	pore water (DOC)
	3		C. Bienhold / A. Boetius (AWI/MPI)	pore water (DOC)
	4		C. Bienhold / A. Boetius (AWI/MPI)	pore water (DOC)
	5	29	JP Balmonte / C. Arnosti (UNC)	Enzyme activity
	6	32	JP Balmonte / C. Arnosti (UNC)	Enzyme activity
	7	20	JP Balmonte / C. Arnosti (UNC)	Enzyme activity
	8	31	JP Balmonte / C. Arnosti (UNC)	Enzyme activity
PS80/260-3	1		-	
	2	29	R. Degen (AWI) / P. Martinez Arbizu (Senckenberg)	Meiofauna
	3		-	
	4	32	R. Degen (AWI) / P. Martinez Arbizu (Senckenberg)	Meiofauna
	5	20	R. Degen (AWI) / P. Martinez Arbizu (Senckenberg)	Meiofauna
	6	31	R. Degen (AWI) / P. Martinez Arbizu (Senckenberg)	Meiofauna (EtOH)
	7		X. Xiao / R. Stein (AWI)	
	8		-	

Station	Core	Core length (cm)	Distributed to	Methods
PS80/277-2	1	24	C. Bienhold / A. Boetius (AWI/MPI)	pore water (Sulfate/Sulfide, Nutrients, DIC, Alkalinity, Iron); 1 set of nutrient samples to K. Bakker for direct measurement on board
	2	25	C. Bienhold / A. Boetius (AWI/MPI)	pore water (Sulfate/Sulfide, Nutrients, DIC, Alkalinity, Iron)
	3	23	C. Bienhold / A. Boetius (AWI/MPI)	Microbiology (DNA, RNA, AODC/FISH, TOC, Chlorophyll, Enzyme activity, porosity, phospholipids)
	4	31	C. Bienhold / A. Boetius (AWI/MPI)	Microbiology (DNA, RNA, AODC/FISH, TOC, Chlorophyll, Enzyme activity, porosity, phospholipids)
	5	31	C. Bienhold / A. Boetius (AWI/MPI)	Microbiology (DNA, RNA, AODC/FISH, TOC, Chlorophyll, Enzyme activity, porosity, phospholipids)
	6	31	X. Xiao / R. Stein (AWI)	Biomarker
PS80/277-3	1		C. Bienhold / A. Boetius (AWI/MPI)	pore water (DOC), backup
	2		C. Bienhold / A. Boetius (AWI/MPI)	pore water (DOC), backup
	3	26	R. Degen (AWI) / P. Martinez Arbizu (Senckenberg)	Meiofauna
	4	19	R. Degen (AWI) / P. Martinez Arbizu (Senckenberg)	Meiofauna
	5	35	R. Degen (AWI) / P. Martinez Arbizu (Senckenberg)	Meiofauna
PS80/277-4	1		C. Bienhold / A. Boetius (AWI/MPI)	pore water (DOC), backup
	2		C. Bienhold / A. Boetius (AWI/MPI)	pore water (DOC), backup
	3	20	V. Puigcorbe & M. Roca (UAB/ICTA), P. Masque (UAB)	Natural radionuclides
	4		F. Wenzhöfer (AWI/MPI)	Microsensor profiles
	5		F. Wenzhöfer (AWI/MPI)	Microsensor profiles
	6		F. Wenzhöfer (AWI/MPI)	Microsensor profiles

Station	Core	Core length (cm)	Distributed to	Methods
PS80/292-1	1	26	C. Bienhold / A. Boetius (AWI/MPI)	pore water (Sulfate/Sulfide, Nutrients, DIC, Alkalinity, Iron); 1 set of nutrient samples to K. Bakker for direct measurement on board
	2	19	C. Bienhold / A. Boetius (AWI/MPI)	pore water (Sulfate/Sulfide, Nutrients, DIC, Alkalinity, Iron)
	3	25	C. Bienhold / A. Boetius (AWI/MPI)	Microbiology (DNA, RNA, AODC/FISH, TOC, Chlorophyll, Enzyme activity, porosity, phospholipids)
	4	39	C. Bienhold / A. Boetius (AWI/MPI)	Microbiology (DNA, RNA, AODC/FISH, TOC, Chlorophyll, Enzyme activity, porosity, phospholipids)
	5	30	C. Bienhold / A. Boetius (AWI/MPI)	Microbiology (DNA, RNA, AODC/FISH, TOC, Chlorophyll, Enzyme activity, porosity, phospholipids)
	6	35	F. Wenzhöfer (AWI), R. Degen (AWI) / P. Martinez Arbizu (Senckenberg)	Microsensor profiles, then Meiofauna
	7	32	R. Degen (AWI) / P. Martinez Arbizu (Senckenberg)	Meiofauna
	8	39	R. Degen (AWI) / P. Martinez Arbizu (Senckenberg)	Meiofauna
PS80/292-2	1	39	C. Bienhold (AWI/MPI)	Isolation of bacteria
	2	39	JP Balmonte / C. Arnosti (UNC)	Enzyme activity
	3	35	JP Balmonte / C. Arnosti (UNC)	Enzyme activity
	4	39	JP Balmonte / C. Arnosti (UNC)	Enzyme activity
	5	38	JP Balmonte / C. Arnosti (UNC)	Enzyme activity
	6	31	X. Xiao / R. Stein (AWI)	Biomarker
	7	37	-	
PS80/296	1	15	C. Bienhold / A. Boetius (AWI/MPI)	pore water (Sulfate/Sulfide, Nutrients, DIC, Alkalinity, Iron); 1 set of nutrient samples to K. Bakker for direct measurement on board
	2	15	C. Bienhold / A. Boetius (AWI/MPI)	pore water (Sulfate/Sulfide, Nutrients, DIC, Alkalinity, Iron)
	3	18	C. Bienhold / A. Boetius (AWI/MPI)	Microbiology (DNA, RNA, AODC/FISH, TOC, Chlorophyll, Enzyme activity, porosity, phospholipids)

Station	Core	Core length (cm)	Distributed to	Methods
	4	16	C. Bienhold / A. Boetius (AWI/MPI)	Microbiology (DNA, RNA, AODC/FISH, TOC, Chlorophyll, Enzyme activity, porosity, phospholipids)
	5	16	C. Bienhold / A. Boetius (AWI/MPI)	Microbiology (DNA, RNA, AODC/FISH, TOC, Chlorophyll, Enzyme activity, porosity, phospholipids)
	6	12.5	F. Wenzhöfer (AWI), R. Degen (AWI) / P. Martinez Arbizu (Senckenberg)	Microsensor profiles, then Meiofauna
	7		R. Degen (AWI) / P. Martinez Arbizu (Senckenberg)	Meiofauna
	8	17	R. Degen (AWI) / P. Martinez Arbizu (Senckenberg)	Meiofauna
PS80/299	1	25	C. Bienhold / A. Boetius (AWI/MPI)	pore water (Sulfate/Sulfide, Nutrients, DIC, Alkalinity, Iron); 1 set of nutrient samples to K. Bakker for direct measurement on board
	2	33	C. Bienhold / A. Boetius (AWI/MPI)	pore water (Sulfate/Sulfide, Nutrients, DIC, Alkalinity, Iron)
	3	36	C. Bienhold / A. Boetius (AWI/MPI)	Microbiology (DNA, RNA, AODC/FISH, TOC, Chlorophyll, Enzyme activity, porosity, phospholipids)
	4	36	C. Bienhold / A. Boetius (AWI/MPI)	Microbiology (DNA, RNA, AODC/FISH, TOC, Chlorophyll, Enzyme activity, porosity, phospholipids)
	5	36	C. Bienhold / A. Boetius (AWI/MPI)	Microbiology (DNA, RNA, AODC/FISH, TOC, Chlorophyll, Enzyme activity, porosity, phospholipids)
	6	33	F. Wenzhöfer (AWI), R. Degen (AWI) / P. Martinez Arbizu (Senckenberg)	Microsensor profiles, then Meiofauna
	7	33	R. Degen (AWI) / P. Martinez Arbizu (Senckenberg)	Meiofauna
	8	35	R. Degen (AWI) / P. Martinez Arbizu (Senckenberg)	Meiofauna
PS80/302	1		C. Bienhold / A. Boetius (AWI/MPI)	pore water (Sulfate/Sulfide, Nutrients, DIC, Alkalinity, Iron); 1 set of nutrient samples to K. Bakker for direct measurement on board
	2	25	C. Bienhold / A. Boetius (AWI/MPI)	pore water (Sulfate/Sulfide, Nutrients, DIC, Alkalinity, Iron)

Station	Core	Core length (cm)	Distributed to	Methods
	3	27	C. Bienhold / A. Boetius (AWI/MPI)	Microbiology (DNA, RNA, AODC/FISH, TOC, Chlorophyll, Enzyme activity, porosity, phospholipids)
	4	26	C. Bienhold / A. Boetius (AWI/MPI)	Microbiology (DNA, RNA, AODC/FISH, TOC, Chlorophyll, Enzyme activity, porosity, phospholipids)
	5	26	C. Bienhold / A. Boetius (AWI/MPI)	Microbiology (DNA, RNA, AODC/FISH, TOC, Chlorophyll, Enzyme activity, porosity, phospholipids)
	6	26	R. Degen (AWI) / P. Martinez Arbizu (Senckenberg)	Meiofauna
	7	25	R. Degen (AWI) / P. Martinez Arbizu (Senckenberg)	Meiofauna
	8	22	R. Degen (AWI) / P. Martinez Arbizu (Senckenberg)	Meiofauna
PS80/309	1	27	C. Bienhold / A. Boetius (AWI/MPI)	pore water (Sulfate/Sulfide, Nutrients, DIC, Alkalinity, Iron); 1 set of nutrient samples to K. Bakker for direct measurement on board
	2	28	Laptev Sea Project	microfossils
	3	26	C. Bienhold / A. Boetius (AWI/MPI)	Microbiology (DNA, RNA, AODC/FISH, TOC, Chlorophyll, Enzyme activity, porosity, phospholipids)
	4	28	C. Bienhold / A. Boetius (AWI/MPI)	Microbiology (DNA, RNA, AODC/FISH, TOC, Chlorophyll, Enzyme activity, porosity, phospholipids)
	5	22	C. Bienhold / A. Boetius (AWI/MPI)	Microbiology (DNA, RNA, AODC/FISH, TOC, Chlorophyll, Enzyme activity, porosity, phospholipids)
	6	28	F. Wenzhöfer (AWI), R. Degen (AWI) / P. Martinez Arbizu (Senckenberg)	Microsensor profiles, then Meiofauna
	7	25	R. Degen (AWI) / P. Martinez Arbizu (Senckenberg)	Meiofauna
	8	27	R. Degen (AWI) / P. Martinez Arbizu (Senckenberg)	Meiofauna
PS80/310	1	25	C. Bienhold / A. Boetius (AWI/MPI)	pore water (Sulfate/Sulfide, Nutrients, DIC, Alkalinity, Iron); 1 set of nutrient samples to K. Bakker for direct measurement on board

Station	Core	Core length (cm)	Distributed to	Methods
	2	25	Laptev Sea Project	microfossils
	3	29	C. Bienhold / A. Boetius (AWI/MPI)	Microbiology (DNA, RNA, AODC/FISH, TOC, Chlorophyll, Enzyme activity, porosity, phospholipids)
	4	16	C. Bienhold / A. Boetius (AWI/MPI)	Microbiology (DNA, RNA, AODC/FISH, TOC, Chlorophyll, Enzyme activity, porosity, phospholipids)
	5	27	C. Bienhold / A. Boetius (AWI/MPI)	Microbiology (DNA, RNA, AODC/FISH, TOC, Chlorophyll, Enzyme activity, porosity, phospholipids)
	6	21	F. Wenzhöfer (AWI), R. Degen (AWI) / P. Martinez Arbizu (Senckenberg)	Microsensor profiles, then Meiofauna
	7	27	R. Degen (AWI) / P. Martinez Arbizu (Senckenberg)	Meiofauna
	8	30	R. Degen (AWI) / P. Martinez Arbizu (Senckenberg)	Meiofauna
PS80/312	1	23	C. Bienhold / A. Boetius (AWI/MPI)	pore water (Sulfate/Sulfide, Nutrients, DIC, Alkalinity, Iron); 1 set of nutrient samples to K. Bakker for direct measurement on board
	2	28	Laptev Sea Project	microfossils
	3	35	C. Bienhold / A. Boetius (AWI/MPI)	Microbiology (DNA, RNA, AODC/FISH, TOC, Chlorophyll, Enzyme activity, porosity, phospholipids)
	4	34	C. Bienhold / A. Boetius (AWI/MPI)	Microbiology (DNA, RNA, AODC/FISH, TOC, Chlorophyll, Enzyme activity, porosity, phospholipids)
	5	36	C. Bienhold / A. Boetius (AWI/MPI)	Microbiology (DNA, RNA, AODC/FISH, TOC, Chlorophyll, Enzyme activity, porosity, phospholipids)
	6	35	F. Wenzhöfer (AWI), R. Degen (AWI) / P. Martinez Arbizu (Senckenberg)	Microsensor profiles, then Meiofauna
	7	23	R. Degen (AWI) / P. Martinez Arbizu (Senckenberg)	Meiofauna
	8	34	R. Degen (AWI) / P. Martinez Arbizu (Senckenberg)	Meiofauna

Station	Core	Core length (cm)	Distributed to	Methods
PS80/313	1	26	C. Bienhold / A. Boetius (AWI/MPI), then Laptev Sea Project	pore water (Sulfate/Sulfide, Nutrients, DIC, Alkalinity, Iron); 1 set of nutrient samples to K. Bakker for direct measurement on board; microfossils
	2	33	C. Bienhold / A. Boetius (AWI/MPI)	Microbiology (DNA, RNA, AODC/FISH, TOC, Chlorophyll, Enzyme activity, porosity, phospholipids)
	3	26.5	C. Bienhold / A. Boetius (AWI/MPI)	Microbiology (DNA, RNA, AODC/FISH, TOC, Chlorophyll, Enzyme activity, porosity, phospholipids)
	4	35	C. Bienhold / A. Boetius (AWI/MPI)	Microbiology (DNA, RNA, AODC/FISH, TOC, Chlorophyll, Enzyme activity, porosity, phospholipids)
	5	33	R. Degen (AWI) / P. Martinez Arbizu (Senckenberg)	Meiofauna
	6	30	F. Wenzhöfer (AWI), R. Degen (AWI) / P. Martinez Arbizu (Senckenberg)	Microsensor profiles, then Meiofauna
PS80/318	1	17	C. Bienhold / A. Boetius (AWI/MPI), then Laptev Sea Project	pore water (Sulfate/Sulfide, Nutrients, DIC, Alkalinity, Iron); 1 set of nutrient samples to K. Bakker for direct measurement on board; microfossils
	2	29	R. Degen (AWI) / P. Martinez Arbizu (Senckenberg)	Meiofauna
	3	30	C. Bienhold / A. Boetius (AWI/MPI)	Microbiology (DNA, RNA, AODC/FISH, TOC, Chlorophyll, Enzyme activity, porosity, phospholipids)
	4	18	C. Bienhold / A. Boetius (AWI/MPI)	Microbiology (DNA, RNA, AODC/FISH, TOC, Chlorophyll, Enzyme activity, porosity, phospholipids)
	5	21	C. Bienhold / A. Boetius (AWI/MPI)	Microbiology (DNA, RNA, AODC/FISH, TOC, Chlorophyll, Enzyme activity, porosity, phospholipids)
	6	23	F. Wenzhöfer (AWI), R. Degen (AWI) / P. Martinez Arbizu (Senckenberg)	Microsensor profiles, then Meiofauna
	7	29	R. Degen (AWI) / P. Martinez Arbizu (Senckenberg)	Meiofauna
PS80/320	1	21	C. Bienhold / A. Boetius (AWI/MPI)	pore water (Sulfate/Sulfide, Nutrients, DIC, Alkalinity, Iron); 1 set of nutrient samples to K. Bakker for direct measurement on board

Station	Core	Core length (cm)	Distributed to	Methods
	2	19	F. Wenzhöfer (AWI), R. Degen (AWI) / P. Martinez Arbizu (Senckenberg)	Microsensor profiles, then Meiofauna
	3	29	C. Bienhold / A. Boetius (AWI/MPI)	Microbiology (DNA, RNA, AODC/FISH, TOC, Chlorophyll, Enzyme activity, porosity, phospholipids)
	4	33	C. Bienhold / A. Boetius (AWI/MPI)	Microbiology (DNA, RNA, AODC/FISH, TOC, Chlorophyll, Enzyme activity, porosity, phospholipids)
	5	30	C. Bienhold / A. Boetius (AWI/MPI)	Microbiology (DNA, RNA, AODC/FISH, TOC, Chlorophyll, Enzyme activity, porosity, phospholipids)
PS80/330	1	22	C. Bienhold / A. Boetius (AWI/MPI), R. Degen (AWI) / Pedro Martinez Arbizu	pore water (Sulfate/Sulfide, Nutrients, DIC, Alkalinity, Iron); 1 set of nutrient samples to K. Bakker for direct measurement on board, then Meiofauna
	2	33	V. Puigcorbe & M. Roca (UAB/ICTA), P. Masque (UAB)	Natural radionuclides
	3	36	C. Bienhold / A. Boetius (AWI/MPI)	Microbiology (DNA, RNA, AODC/FISH, TOC, Chlorophyll, Enzyme activity, porosity, phospholipids)
	4	34	C. Bienhold / A. Boetius (AWI/MPI)	Microbiology (DNA, RNA, AODC/FISH, TOC, Chlorophyll, Enzyme activity, porosity, phospholipids)
	5	32	C. Bienhold / A. Boetius (AWI/MPI)	Microbiology (DNA, RNA, AODC/FISH, TOC, Chlorophyll, Enzyme activity, porosity, phospholipids)
	6	30	R. Degen (AWI) / P. Martinez Arbizu (Senckenberg)	Meiofauna
	7	36	R. Degen (AWI) / P. Martinez Arbizu (Senckenberg)	Meiofauna
PS80/338-1	1	20	C. Bienhold / A. Boetius (AWI/MPI)	pore water (Sulfate/Sulfide, Nutrients, DIC, Alkalinity, Iron); 1 set of nutrient samples to K. Bakker for direct measurement on board, then Meiofauna
	2	33	R. Degen (AWI) / P. Martinez Arbizu (Senckenberg)	Meiofauna
	3	36	C. Bienhold / A. Boetius (AWI/MPI)	Microbiology (DNA, RNA, AODC/FISH, TOC, Chlorophyll, Enzyme activity, porosity, phospholipids)
	4	36	C. Bienhold / A. Boetius (AWI/MPI)	Microbiology (DNA, RNA, AODC/FISH, TOC, Chlorophyll, Enzyme activity, porosity, phospholipids)

Station	Core	Core length (cm)	Distributed to	Methods
	5	37	C. Bienhold / A. Boetius (AWI/MPI)	Microbiology (DNA, RNA, AODC/FISH, TOC, Chlorophyll, Enzyme activity, porosity, phospholipids)
	6	36	R. Degen (AWI) / P. Martinez Arbizu (Senckenberg)	Meiofauna
	7	35	R. Degen (AWI) / P. Martinez Arbizu (Senckenberg)	Meiofauna
PS80/338-2	1		C. Bienhold / A. Boetius (AWI/MPI)	pore water (DOC)
	2		C. Bienhold / A. Boetius (AWI/MPI)	pore water (DOC)
	3		C. Bienhold / A. Boetius (AWI/MPI)	pore water (DOC)
	4		C. Bienhold / A. Boetius (AWI/MPI)	pore water (DOC)
	5		X. Xiao / R. Stein (AWI)	Biomarker
	6	22	V. Puigcorbe & M. Roca (UAB/ICTA), P. Masque (UAB)	Natural radionuclides
	7		-	
PS80/350-1	1	33	C. Bienhold / A. Boetius (AWI/MPI)	pore water (Sulfate/Sulfide, Nutrients, DIC, Alkalinity, Iron); 1 set of nutrient samples to K. Bakker for direct measurement on board, then Meiofauna
	2	39	C. Bienhold / A. Boetius (AWI/MPI)	Frank profiling, then Microbiology (DNA, RNA, AODC/FISH, TOC, Chlorophyll, Enzyme activity, porosity, phospholipids)
	3	32	C. Bienhold / A. Boetius (AWI/MPI)	Microbiology (DNA, RNA, AODC/FISH, TOC, Chlorophyll, Enzyme activity, porosity, phospholipids)
	4	33	C. Bienhold / A. Boetius (AWI/MPI)	Microbiology (DNA, RNA, AODC/FISH, TOC, Chlorophyll, Enzyme activity, porosity, phospholipids)
	5	36	C. Bienhold / A. Boetius (AWI/MPI)	Microbiology (DNA, RNA, AODC/FISH, TOC, Chlorophyll, Enzyme activity, porosity, phospholipids)
	6	33	F. Wenzhöfer (AWI), R. Degen (AWI) / P. Martinez Arbizu (Senckenberg)	Microsensor profiles, then Meiofauna
	7	38	R. Degen (AWI) / P. Martinez Arbizu (Senckenberg)	Meiofauna

Station	Core	Core length (cm)	Distributed to	Methods
	8	22	R. Degen (AWI) / P. Martinez Arbizu (Senckenberg)	Meiofauna
PS80/350-2	1	26	C. Bienhold / A. Boetius (AWI/MPI)	pore water (DOC)
	2	26	C. Bienhold / A. Boetius (AWI/MPI)	pore water (DOC)
	3	33	C. Bienhold / A. Boetius (AWI/MPI)	pore water (DOC)
	4	20	C. Bienhold / A. Boetius (AWI/MPI)	pore water (DOC)
	5	33	JP Balmonte / C. Arnosti (UNC)	Enzyme activity
	6	35	JP Balmonte / C. Arnosti (UNC)	Enzyme activity
	7	35	JP Balmonte / C. Arnosti (UNC)	Enzyme activity
PS80/350-3	1	25	X. Xiao / R. Stein (AWI)	Biomarker
	2	34	JP Balmonte / C. Arnosti (UNC)	Enzyme activity
	3	34		back-up
	4	33	V. Puigcorbe & M. Roca (UAB/ICTA), P. Masque (UAB)	Natural radionuclides
	5	31		back-up
	6	35		back-up
	7	33	JP Balmonte / C. Arnosti (UNC)	Enzyme activity
	8	35	back-up	
PS80/361-1	1		C. Bienhold / A. Boetius (AWI/MPI)	pore water (Sulfate/Sulfide, Nutrients, DIC, Alkalinity, Iron); 1 set of nutrient samples to K. Bakker for direct measurement on board, then Meiofauna
	2	36	C. Bienhold / A. Boetius (AWI/MPI)	Frank profiling, then Microbiology (DNA, RNA, AODC/FISH, TOC, Chlorophyll, Enzyme activity, porosity, phospholipids)
	3	33	F. Wenzhöfer (AWI), R. Degen (AWI) / P. Martinez Arbizu (Senckenberg)	Microsensor profiles, then Meiofauna
	4	36	C. Bienhold / A. Boetius (AWI/MPI)	Frank profiling, then Microbiology (DNA, RNA, AODC/FISH, TOC, Chlorophyll, Enzyme activity, porosity, phospholipids)

Station	Core	Core length (cm)	Distributed to	Methods
	5	36	C. Bienhold / A. Boetius (AWI/MPI)	Frank profiling, then Microbiology (DNA, RNA, AODC/FISH, TOC, Chlorophyll, Enzyme activity, porosity, phospholipids)
	6	32	C. Bienhold / A. Boetius (AWI/MPI)	Frank profiling
	7	29	R. Degen (AWI) / P. Martinez Arbizu (Senckenberg)	Meiofauna
	8	33	R. Degen (AWI) / P. Martinez Arbizu (Senckenberg)	Meiofauna
PS80/362-1	1	23	C. Bienhold / A. Boetius (AWI/MPI)	pore water (DOC)
	2	23	C. Bienhold / A. Boetius (AWI/MPI)	pore water (DOC)
	3		C. Bienhold / A. Boetius (AWI/MPI)	pore water (DOC)
	4		C. Bienhold / A. Boetius (AWI/MPI)	pore water (DOC)
	5	36	X. Xiao / R. Stein (AWI)	Biomarker
	6		V. Puigcorbe & M. Roca (UAB/ICTA), P. Masque (UAB)	Natural radionuclides
	7			
	8		C. Bienhold (AWI/MPI)	Isolation of bacteria
PS80/363-1	1		C. Bienhold / A. Boetius (AWI/MPI)	Extra sampling
	2		C. Bienhold / A. Boetius (AWI/MPI)	Extra sampling
	3	28	JP Balmonte / C. Arnosti (UNC)	Enzyme activity
	4	34	JP Balmonte / C. Arnosti (UNC)	Enzyme activity
	5	34	JP Balmonte / C. Arnosti (UNC)	Enzyme activity
	6	34	JP Balmonte / C. Arnosti (UNC)	Enzyme activity
	7	31	JP Balmonte / C. Arnosti (UNC)	Enzyme activity
	8	33	R. Degen (AWI) / P. Martinez Arbizu (Senckenberg)	Meiofauna

Station	Core	Core length (cm)	Distributed to	Methods
PS80/385-1	no cores			
PS80/394-1	1	48	C. Bienhold / A. Boetius (AWI/MPI)	pore water (Sulfate/Sulfide, Nutrients, DIC, Alkalinity, Iron); 1 set of nutrient samples to K. Bakker for direct measurement on board, then Meiofauna
	2	48	R. Degen (AWI) / P. Martinez Arbizu (Senckenberg)	Meiofauna
	3	47	C. Bienhold / A. Boetius (AWI/MPI)	Microbiology (DNA, RNA, AODC/FISH, TOC, Chlorophyll, Enzyme activity, porosity, phospholipids)
	4	45	C. Bienhold / A. Boetius (AWI/MPI)	Microbiology (DNA, RNA, AODC/FISH, TOC, Chlorophyll, Enzyme activity, porosity, phospholipids)
	5	46	C. Bienhold / A. Boetius (AWI/MPI)	Microbiology (DNA, RNA, AODC/FISH, TOC, Chlorophyll, Enzyme activity, porosity, phospholipids)
	6	40	R. Degen (AWI) / P. Martinez Arbizu (Senckenberg)	Meiofauna
	7	42	R. Degen (AWI) / P. Martinez Arbizu (Senckenberg)	Meiofauna
	8	46	R. Degen (AWI) / P. Martinez Arbizu (Senckenberg)	Meiofauna
PS80/394-2	1	48	C. Bienhold / A. Boetius (AWI/MPI)	pore water (DOC)
	2	48	C. Bienhold / A. Boetius (AWI/MPI)	pore water (DOC)
	3	48	C. Bienhold / A. Boetius (AWI/MPI)	pore water (DOC)
	4	48.5	C. Bienhold / A. Boetius (AWI/MPI)	pore water (DOC)
	5	46	V. Puigcorbe & M. Roca (UAB/ICTA), P. Masque (UAB)	Natural radionuclides
	6	49	X. Xiao / R. Stein (AWI)	Biomarker
	7	47	C. Bienhold / A. Boetius (AWI/MPI)	Microbiology (backup)

Table A8: Lander stations performed during ICEARC ARK-XXVII/3

Event label	Lander No.	Water depth (m)	Lat. (N)	Long. (E)	Deployment	Comments
PS80/203-1	2	398	81°26.834'	31°06.954'	05.08.-06.08.2012	Test Station
PS80/221-1	2	4011	83°59.805'	30°05.984'	08.08.-11.08.2012	Ice #1 PS80/224-1
PS80/221-2	4	4016	83°59.738'	29°54.741'	08.08.-11.08.2012	Ice #1 PS80/224-1
PS80/221-3	1	4013	83°59.416'	29°46.549'	08.08.-11.08.2012	Ice #1 PS80/224-1
PS80/236-1	1	3470	83°55.100'	78°09.439'	14.08.-17.08.2012	Ice #2 PS80/237-1
PS80/236-2	4	3464	83°55.450'	78°29.962'	14.08.-17.08.2012	Ice #2 PS80/237-1
PS80/236-3	2	3466	83°55.414'	78°40.396'	14.08.-17.08.2012	Ice #2 PS80/237-1
PS80/251-1	2	3557	82°38.716'	108°35.860'	19.08.-22.08.2012	Ice #3 PS80/255-1
PS80/251-2	4	3560	82°38.964'	108°46.573'	19.08.-22.08.2012	Ice #3 PS80/255-1
PS80/251-3	1	3605	82°38.196'	108°52.315'	19.08.-23.08.2012	Ice #3 PS80/255-1
PS80/290-1	1	3420	79°42.382'	130°35.464'	28.08.-03.09.2012	Laptev Sea
PS80/290-2	4	3401	79°40.971'	130°35.751'	28.08.-03.09.2012	Laptev Sea
PS80/290-3	2	3398	79°40.005'	130°35.815'	28.08.-03.09.2012	Laptev Sea
PS80/334-1	2	4356	85°10.148'	122°59.677'	07.09.-10.09.2012	Ice #6 PS80/335-1
PS80/334-2	4	4354	85°09.072'	123°10.892'	07.09.-10.09.2012	Ice #6 PS80/335-1
PS80/334-3	1	4356	85°07.936'	123°08.099'	07.09.-10.09.2012	Ice #6 PS80/335-1
PS80/371-1	1	4369	88°45.791'	55°41.546'	23.09.-23.09.2012	Ice #8 PS80/360-1

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