RV Sonne SO-250

Cruise Report / Fahrtbericht

Tomakomai - Yokohama (Japan)

16.08.-26.09.2016

SO-250 KuramBio II

(Kuril Kamchatka Biodiversity Studies)

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TOC / Inhaltsverzeichnis

1. Cruise summary / Zusammenfassung

German / Deutsch

Die deutsch-russische Expedition KuramBio II (Kurile-Kamtchatka Biodiversity Studies II) wurde vom 16.8.-26.9.2016 mit FS *Sonne* im Kurilen-Kamtschatka-Graben durchgeführt (SO-250). Diese Expedition schließt sich an die russisch-deutsche SoJaBio (Sea of Japan Biodiversity Studies) Expedition ins Japanische Meer in 2010, die deutsch-russische KuramBio Expedition in das NW pazifische Abyssal bei dem Kurilen-Kamtschatka-Graben in 2012 sowie die russisch-deutsche SokhoBio (Sea of Ochotzk Biodiversity Studies) Expedition in 2015 an. Ziele dieser Expeditionen waren, die Biodiversität und Biogeographie zu erfassen, sowie eine trophische Charakterisierung der benthischen Organismen vorzunehmen.

Während der KuramBio I Expedition wurde ein Vielfaches der bis dato bekannten Artenzahlen nachgewiesen, und der Kenntnisstand aus den Tiefen zwischen 500–6000 m von 300 Arten auf >1781 Arten erweitert. Mindestens die Hälfte dieser Arten ist neu für die Wissenschaft. Die artenreichsten Proben hatten wir jedoch am Hang des Kurilen-Kamtschatka-Grabens gewonnen. Daher nahmen wir an, dass die v-förmige Topographie des Kurilen-Kamtschatka-Grabens für eine gute Nahrungsverfügbarkeit auch im Hadal sorgt und zu einer erhöhten Biodiversität in großen Tiefen führt. Während der Expedition KuramBio II wurden daher die folgenden Hypothesen getestet: 1. Das Hadal des Kurilen-Kamtschatka-Grabens beherbergt eine hohe Artenzahl (die nicht niedriger ist als die der angrenzenden abyssalen Ebene). 2. Die Anzahl endemischer Arten steigt mit zunehmender Tiefe im Kurilen-Kamtchatka-Graben. 3. Die hadalen Stationen des Kurilen-Kamtschatka-Grabens isolieren die Arten von denen des Ochotskischen Meeres und des angrenzenden Abyssals im Nordwestpazifik.

Wir haben an insgesamt elf Stationen zwischen ca. 5100 und 9583 m Tiefe eine CTD eingesetzt, das EM122, ein Multischließnetz, den Multicorer, Großkastengreifer, Epibenthosschlitten, sowie ein Agassiz Trawl. So haben wir die Meeresbodentopographie dokumentiert und Organismen aller Größenklassen (Protisten bis Megafauna) gesammelt. Unsere Daten, basierend auf den ersten Auswertungen an Bord des FS *Sonne*, dokumentieren eine sehr reiche Fauna im Kurilen-Kamtschatka Graben in allen Organismengruppen, von Protisten über Meio-, Makro- und Megafauna. Der offene Pazifik birgt weitestgehend eine andere Fauna als das Japanische und auch das Ochotskische Meer. Dennoch gibt es einige Arten, die auch im Ochotskischen Meer nachgewiesen worden sind. Wir müssen daher davon ausgehen, dass der Kurilen-Kamtschatka Graben in der Tat die Fauna des Kurilen Beckens des Ochotskischen Meeres vom NW Pazifik isoliert. Dennoch gibt es auch Arten, die diese Isolationsbarriere zu überbrücken vermögen und möglicherweise durch die Krusenstern und Bussol Straße das offene Abyssal des NW Pazifiks erreichen können. Ob der prozentuale Anteil der Endemiten im Kurilen-Kamtschatka Graben mit zunehmender Tiefe zunimmt kann jedoch erst in den Heimatlaboren nach detaillierter Analyse und Identifikation der Arten beantwortet werden.

English / Englisch

The German-Russian expedition KuramBio II (Kurile-Kamchatka Biodiversity Studies II) with RV *Sonne* has been performed between 16.8.–26.9.2016 in the Kurile-Kamchatka Trench (KKT) region (SO-250). This expedition follows the Russian-German SoJaBio (Sea of Japan Biodiversity Studies) expedition to the Sea of Japan in 2010, the German-Russian KuramBio expedition to the KKT area in 2012, and the Russian German SokhoBio (Sea of Okhotzk Biodiversity Studies) expedition in 2015. The goals of these expeditions were to study the biodiversity and biogeography as well as trophic characteristics of the benthic organisms in these different northwest Pacific deep-sea environments.

During the KuramBio I expedition we sampled a much higher number of species than were previously known and increased the knowledge of deep-sea species from depths between 5000-6000 m from 300 known species to >1781 species. At least 50 % of these species are new to science. The richest samples, however, have been collected at the slope of the KKT, therefore we assumed that the v-shaped topography of the KKT might enhance food availability and lead to an even higher biodiversity at larger depths. During the expedition KuramBio II we would therefore like to test the following hypotheses: 1. The hadal of the KKT is characterized by a high number of species (not lower than in the abyssal plain near the KKT). 2. The number of endemic species will increase with increasing depth in the KKT. 3. The hadal depths of the KKT isolate benthic species of the Sea of Okhotsk from species of the abyssal Northwest Pacific. We have deployed a CTD, multinet, multiple corer, box corer, epibenthic sledge, and Agassiz trawl at eleven working areas between 5100 and 9583 m depth in order to document the topography of the seafloor and to collect organisms of all size classes from protists to megafauna.

Based on the first investigations on board of the RV *Sonne*, our data document a rich fauna in the Kuril-Kamchatka Trench in all groups of organisms, from protists to meio-, macro-, and megafauna. The fauna of the open NW Pacific differs to the fauna of Sea of Japan and also to the fauna of the Sea of Okhotsk. We have to assume that the Kuril-Kamchatka Trench indeed isolates the fauna of the Kuril Basin of the Sea of Okhotsk from the NW Pacific. Nevertheless, there also appear to be species which can cross the Krusenstern and Bussol Straits and reach the abyssal depth of the NW Pacific Ocean. Whether the percentage of endemic species in the Kuril-Kamchatka Trench increases with increasing depth can only be answered after more detailed analyses and identification of the species in the home laboratories.

2. Participants / Teilnehmer

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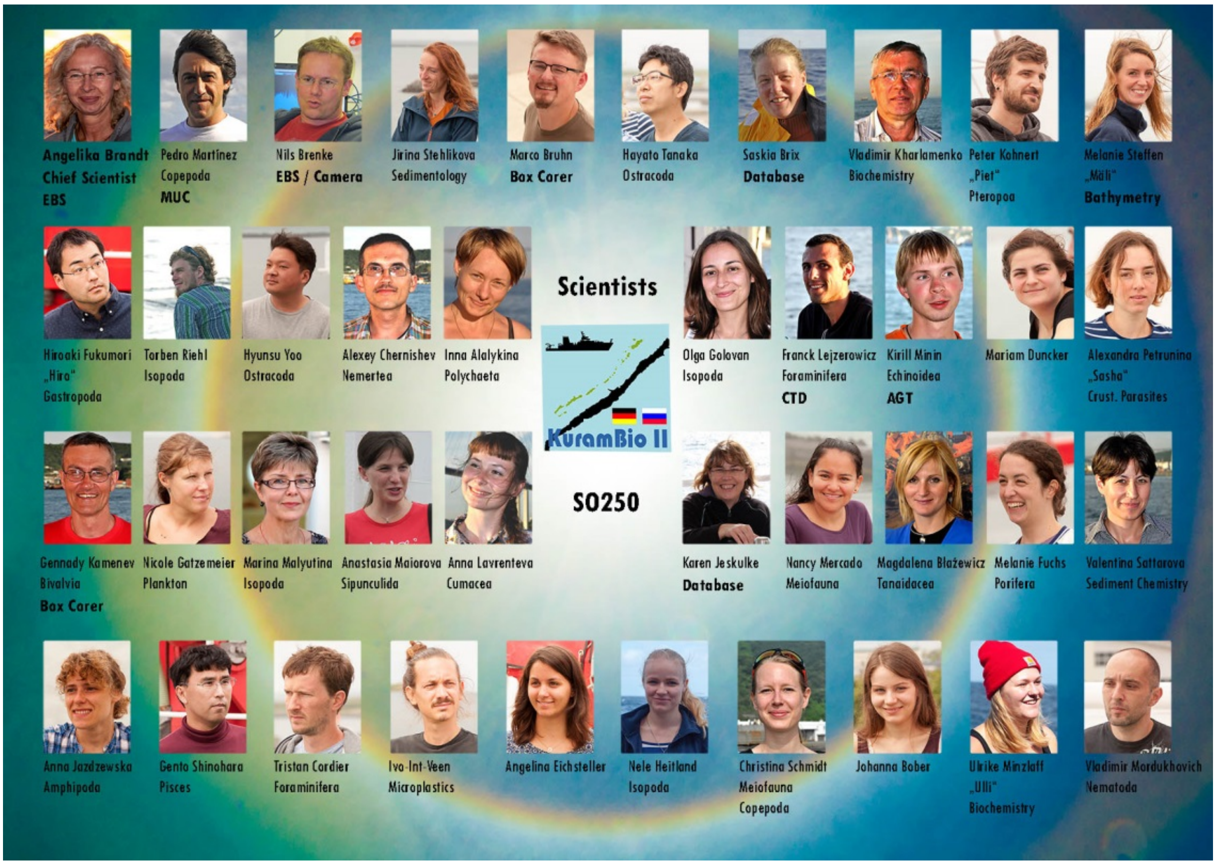
Scientific party / wissenschaftliche Fahrtteilnehmer



Scientists of the SO 250-Expedition KuramBio II		
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Błażewicz, Magdalena, Dr.	Marine Biology	PBO
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Brix, Saskia, Dr.	Marine Biology, Genetics	DZMB HH
Bruhn, Marco	Technician	DZMB WHV
Chernishev, Alexey, Prof. Dr.	Marine Biology	IMB
Cordier, Tristan	Marine Biology	UG Switzerl.
Duncker, Mariam	Marine Biology	CeNak, ZMH
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Gatzemeier, Nicole	Technician	DZMB HH
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HCU – HafenCity University Hamburg
HU Korea – Hanyang University Korea
IORAS – Shirshov Institute, Moscow, Russia
Korea – Hanyang University in Seoul, Korea
MSU - M.V.Lomonosov Moscow State University
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POI – Pacific Oceanographic Institute
PBO – University of Lodz, Department of Polar Biology and Oceanobiology
SAMS – Scottish Association for Marine Science
TMSS – Takehara Marine Science Station, Hiroshima University, Japan
UG – University of Geneva, Switzerland
UT – University of Tokyo
ZSM – Zoologische Staatssammlung München

Crew / Mannschaft

Besatzung / *Crew* **Expedition / *Cruise SO*250**

Dienstgrad / *Rank*	**Name, Vorname / Name, first name**
Kapitän	Meyer, Oliver
Ltd. 1. Naut. Offizier	Soßna, Yves
1. Naut. Offizier	Hoffsommer, Lars
2. Naut. Offizier	Burzlaff, Stefan
Schiffsarzt	Walther, Anke
Ltd. Techn. Offizier	Großmann, Matthias
2. Techn. Offizier	Stegmann, Tim
2. Techn. Offizier	Horsel, Roman
Elektriker	Beyer, Thomas
Elektriker	De Buhr, Henning
Ltd. Elektroniker (WTD)	Grossmann, Matthias
Elektroniker (WTD)	Plöger, Miriam
System-Manager (WTD)	Pregler, Hermann
Schiffsmechaniker (Decksschl.)	Blohm, Volker
Schiffsmechaniker (Masch.)	Talpai, Matyas
Schiffsmechaniker (Masch.)	Münch, Lothar
Schiffsmechaniker (Masch.)	Lübcke, Rene
Koch	Tiemann, Frank
Kochsmaat	Spieler, Andreas
1. Steward	Lemm, Rene
2. Steward	Royo, Luis
2. Steward	Kroeger, Sven
2. Steward	Stöcker, Frank
Bootsmann	Schrapel, Andreas
Schiffsmechaniker (Deck)	Bierstedt, Torsten
Schiffsmechaniker (Deck)	Vogel, Dennis
Schiffsmechaniker (Deck)	Eidam, Oliver
Schiffsmechaniker (Deck)	Koch, Stefan
Schiffsmechaniker (Deck)	Fricke, Ingo
Schiffsmechaniker (Deck)	Sprenkel, Sebastian
Schiffsmechaniker (Deck)	Rieger, Willi
Elektriker	Seltz, Christian

3. Narrative of the cruise / Ablauf der Forschungsfahrt

Forty scientists from of nine nationalities (17 Germans, twelve Russians, three Japanese, respectively two French and Polish, and each one South Korean, Czech, Mexican, and Spaniard) embarked the research vessel Sonne for the deep-sea expedition KuramBio II (SO 250) in Tomakomai (Japan, Hokkaido) on August 15th. In the afternoon of the same day we started unpacking our cargo as well as assembling gears and setting up the labs. In the morning of August 16th 2016, RV *Sonne* left the Tomakomai harbor at 9.00 am.

The first study area A8 and first station were reached already on Thursday August 18th at midnight. The first station was located at 43°82N 151°76'E at 5130 m depth. We decided to begin our sampling at a "shallow" site, and not the deep A1 area with 8200 m in order to accelerate the initiation of our work flow on board which includes time-consuming sample sorting etc., as well as to establish routine in the deployment of the gears before operating them in over 8000 m depth. We started to deploy a CTD prior to seafloor mapping using the EM 122, as we needed the CTD for the calibration of the multibeam echo sounder (EM 122). We also collected both water column measurements and water samples for biochemistry. Following the deployment of the CTD (a device measuring physical parameters of the water column) with a rosette of Niskin bottles (a water sampler) down to 2000 m depth, a multi-closing plankton net was deployed. The multi-closing plankton net is used, specifically for catching planktonic organisms at certain depths. The sea floor was scanned with an echo sounder to study the topography. Based on the newly created maps, the benthos sampling stations were planned. The benthos gear included a multicorer (MUC), a giant box corer (BC), a camera-epibenthic sledge (C-EBS) or epibenthic sledge (EBS) without camera (below 6000 m depth), as well as an Agassiz trawl (AGT). The complete set of instruments was successfully operated and the scientists on board RV *Sonne* productively worked at abyssal and hadal depths.

During the third week we finished our work in areas A6 and A5 and started to work in area A4 at 8700 m depth. In the late evening of the 31st of August we had to interrupt our station work and return to Tomakomai due to a case of illness of a crew member who had to be brought to hospital. However, since the 2nd of September in the morning 4 a.m. we were back in our study area. We were able to use the steaming time back to the station A4 for seafloor mapping in order to obtain more precise bathymetric information of the topography of our next research area A7 at depth of roughly 9500 m.

Back at station area A4 we had to start with the multinet again, which we had to interrupt in order to leave to Tomakomai as soon as possible. After this deployment we got the first sediment from depth 8700 m on deck by means of large box corer (GKG), but the GKG was full to the brim, thus the surface of the sample was disturbed. For that reason we gave the GKG a second trial, however, with the same result and sediment up to the top of the gear. The first Multicorer (MUC) deployment did not release in the soft sediment and returned on deck empty, however, with muddy corers. We now know that the sediment in the central Kuril Kamchatka Trench is very soft and has a high water content what hampers easy sampling with corers. We therefore changed our deployment strategy for the MUC and retrieved it at higher speed right after bottom contact, in order to allow for an instant closing and sample securing of the twelve corers. This strategy then brought us excellent material for sedimentology and meiofaunal research from depth 8700 m back on deck, and therefore we repeated this deployment once more, and after additional three hours of waiting, the MUC came on deck with a wonderful sample. All twelve cores were filled with sediment and there were still some 10 cm of overlaying bottom water, so that the sample was perfect. On September 8th we reached the area A3 and after the deployment of CTD and the EM122 we determined the position for the corers and towed equipment before we started with the veer the multinet.

Until Saturday morning of the 10th September we were able to work at this station, when we had to weather a storm and stop working. We therefore could not repeat the AGT and EBS deployments in this area, as we had no additional time to loose after the long journey back to back to Japan. We therefore decided to map the hadal of the Kuril-Kamchatka trench in this region of A7 with the multi-beam echo sounder even better in order to possibly move the 9500 m station further to the southwest. When we realized that the southern-more areas were getting shallower we decided to get back to the planned 9500 m station, and when the weather was favorable enough we deployed the box corer at this depth which brought a phantastic sample from the seafloor in 9500 m depth with a rich fauna, for example pogonophorans, which are derived polychaetes which feed chemosynthetically via symbiontic bacteria. Afterwards, we tried to take meiofauna and sediment samples with the multiple corer (MUC). Despite trying to adjust the setup of the gear and the deployment protocol, we did not succeed and had to come up with an alternative plan. Instead, we deployed the box corer once more and took subsamples manually with the MUC cores. Then, we ventured to deploy the epibenthic sledge (EBS). For this operation had to make use of the full length of available work length of the cable, 11,000 m. This was not the first time because already during the maiden voyage of RV *Sonne* (Vema-TRANSIT; SO 237) EBS samples were taken from the bottom of the Puerto Rico Trench from > 8.300 m. However, the key difference between these deployments was that here at the KKT the water depth exceeds that of the PRT by more than thousand meters. As a consequence the EBS could not be deployed in the usual way, using a cable length 1.5 times that of the water depth, simply because we do not have so much wire available. Thus the deployment was a challenge! We reduced the towing speed but trawled for longer time, about one hour. The expectations and anxiety were thus high when the EBS broke through the surface after many hours of deployment. Everyone cheered when we saw that indeed there were nice samples in the cod ends of the EBS. Echiurids and elpidiid holothurians, amphipods, bivalves (clams, mussels) and many other taxa were found in this sample. Subsequently we were as excited while awaiting the AGT. Just as the EBS, the deployment was successful and we collected loads of megafauna organisms from the hadal – for example more than 1100 holothurians. Like at all sampling sites before we also encountered a high abundance at this deepest station. This also includes organisms that make use of calcium carbonate for skeletal hard structures. Accordingly we are able to reject the hypothesis that such organisms cannot thrive below the calcite compensation depth (depending on the region between 3000–5000 m) due to problems with building up calcareous structures.

After we finished the deepest hadal station successfully we mapped our way towards area A10 during the night and started collecting more samples in the early morning of 17th September. First we deployed the plankton net. After the deployments of a box corer and two multiple corers the EBS presented completely different sediment as compared to the hadal stations. It contained sand and gravel with small stones. This site is located at the upper slope of the KKT towards the Sea of Okotsk and is apparently affected by strong currents which erode the smaller sediment particles. Nevertheless we could already get a glimpse at the many small critters that the sample contained during washing and sieving it. It was shown that the hadal organisms of many taxa are really larger at abyssal depths than in the abyss. The AGT also brought a good sample with a lot of megafauna as well as several big stones.

After finishing our work in area A10 we returned to A9, where we completed our set of deployments with the multiple corer, EBS, as well as AGT. Subsequently we continued mapping the seafloor around the final site A11 in order to understand the bottom topography better and make appropriate decisions as to where to deploy the benthos gear. We were also interested in finding the deepest location in that area, as it has been reported that the maximum depth of the Kuril-Kamchatka Trench would be 10542 m at 44.07.00'N 150°18.00'O (Jamieson, 2015). However, the data in the literature are incorrect and need to be revised. Since we wanted to sample a fifth station at hadal depths in the middle of the trench we chose the deepest area in this region and thus could sample once more in > 9500 m depth. We again deployed our devices successfully and now have a very good comparison at this great depth. Comparably to the last very deep station at 9581 m one could immediately recognize that the diversity of organisms was significantly lower than at abyssal depths, but the abundances of species that occurred in the samples was immense. At this last station area we immediately saw the same species which we sampled at the last 9500 m station in high numbers of individuals. Our work in this last station area was completed on Thursday, 22nd September at about midnight (0.00) with the deployment of a multinet.

During the expedition SO250, KuramBio II, we travelled 40 days, 22 hours and 36 minutes on board of RV Sonne over a distance of 3985 nautical miles. We have sampled 106 stations with a standardized deployment of our gear. We have deployed 53.100 m of single-conductor cable and 619.841 m of deep-sea wire during the course of the last six weeks. Our Access database has recorded 869 numbers for kautex jars as well as 3123 inventory numbers for sorted samples. We bring very extensive animal material and PCR products back home.

Moreover, we have informed the public about our work by means of 42 daily logs in three languages (German, English, Russian) published via the Senckenberg Museum's blog farm (http://www.senckenberg.de/root/index.php?page_id=5253&blogEntryID=450).

4. Aims of the Cruise / Zielsetzung der Forschungsfahrt

KuramBio II is already the fourth expedition to the Northwest Pacific that was conducted as a German-Russian collaborative enterprise. Initially, the fauna of the Sea of Japan (East Sea) was investigated during the Russian-German SoJaBio (Sea of Japan Biodiversity study) campaign in summer 2010 onboard the Russian vessel *Akademik M.A. Lavrentjev*. In 2012 the Northwest Pacific Abyssal Plain was investigated in the Kuril-Kamchatka region sailing onboard the previous RV *Sonne* in order to compare the open ocean with the semi-enclosed marginal sea. During this first KuramBio campaign, depths between 4700–5700 m were studied. The follow-up project SokhoBio (Sea of Okhotsk Biodiversity study) took place in summer 2015, again with RV *Akademik M.A. Lavrentjev*. This marginal sea is characterized by a depth similar to that of the Sea of Japan (ca. 3500–3700 m); however, it has stronger exchange with the open Pacific through rather deep sills such as the Krusenstern Strait (1920 m) und Bussol Strait (ca. 2500 m). The Sea of Okhotsk is not only isolated from the open Pacific by the Kuril Islands but from the perspective of the benthos the Kuril-Kamchatka Trench (KKT) may represent another obstacle that may hinder migration and dispersal. It is up to 9500 m deep.

One of the major research questions in the KuramBio II project is therefore whether the KKT has an isolating effect on the distribution of abyssal organisms inhabiting either the Sea of Okhotsk and Kuril Islands side or the Pacific side of the trench. We are testing this hypothesis on various taxonomic groups and size classes of organisms that cover various modes of reproduction and dispersal, from taxa with brood care to those with free-swimming larvae. To study the depth limits of their distribution, we will take samples at various depths, allowing us to draw conclusions about the biogeography of the whole region.

In our studies we also consider environmental aspects, such as sedimentological parameters, and investigate morphological as well as genetical data of all size classes of eukaryotes (Protists, Meio-, Macro-, and Megafauna) from the trench and neighboring abyssal and bathyal samples. Furthermore, the biodiversity measurements based on our modern sampling techniques are going to be compared to the biodiversity described by Russian scientists that studied the region extensively throughout the 20th century during the RV *Vitjaz* expeditions. So far, our results indicate a much higher diversity than known from the *Vitjaz* expeditions which could be explained partly due to the smaller mesh sizes that we use today. Additionally we are able to differentiate between morphologically cryptic species using DNA based species delimitation methods.

We are also focusing on the mechanisms that contribute to the generation of this diversity.

Drivers limiting gene flow and thus leading to divergence and eventually speciation are poorly understood, in the case of deep-sea fauna, as well as the most important selection factors. Similarly, the most important selection factors are not well studied. This pioneering character makes studying diversity in these great depths so fascinating and with every sample we gain new insights and understanding about the organisms of the deep-sea floor.

The specific hypotheses we want to test during the KuramBio II expedition are:

Hypothesis 1: The hadal of the Kuril-Kamchatka Trench is characterized by a high number of species.

Hypothesis 2: The number of endemic species will increase with increasing depth in the KKT.

Hypothesis 3: The hadal depths of the Kuril-Kamchatka Trench are isolating benthic species of the Sea of Okhotsk from species of the abyssal Northwest Pacific.

Hypothesis 4: The main food source of epibenthic copepods (which we will use as a model taxon) is detritus, while planktonic copepods feed mainly on diatoms and microzooplankton.

5. Agenda of the cruise / Programm der Forschungsfahrt

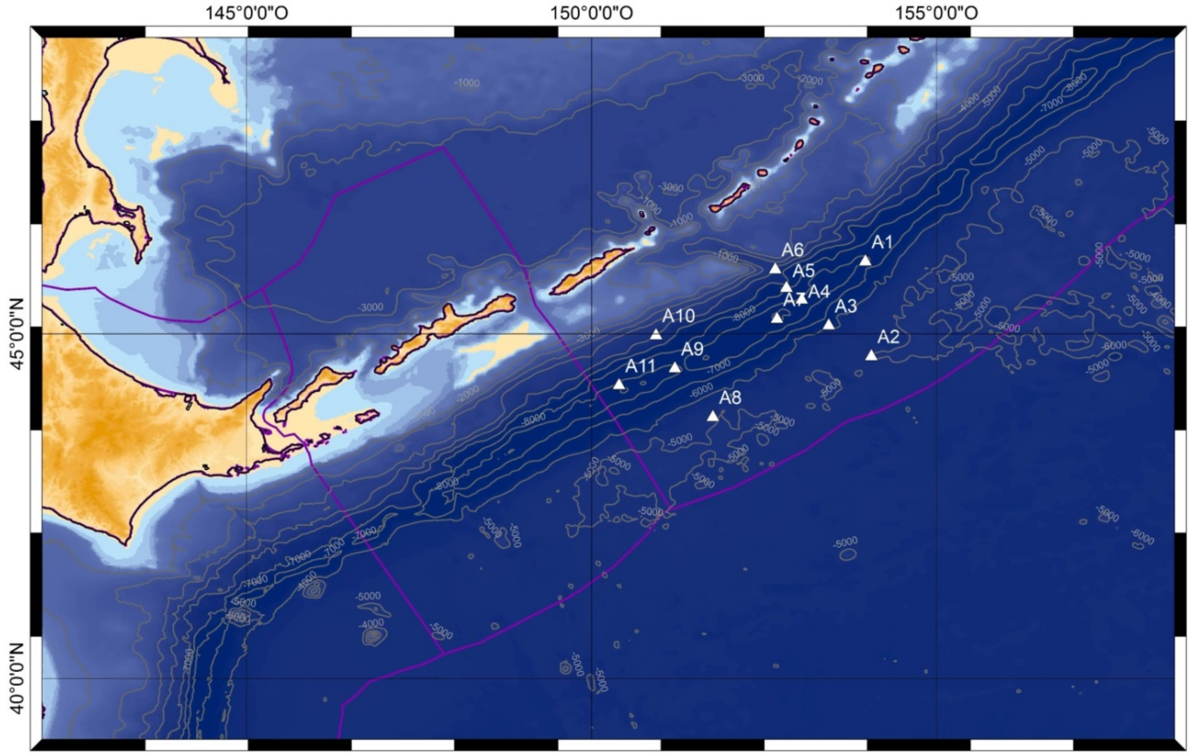

Fig. 1: The work area of the KuramBio II expedition is the Kuril-Kamchatka Trench in the Russian EEZ for which the work permit was granted including the planned station areas.

The Russian permission to work in this area allowed us to sample according to our plans and also gave us the possibility to slightly adjust the station positions to different depths where necessary for the trawled gear due to inaccurate bathymetric information. In some instances the bathymetric information retrieved from available bathymetric charts (GEBCO: *www.**gebco**.net/*) prior to the expedition was incorrect by up to 600–800 m.

5.1. Work Programme

KuramBio II was performed from board of the new RV Sonne between 16. August – 26. September 2016. The samples were planned to be taken in roughly 5000, 6500, 8000, and 9500 m depth (depending on suitable areas for trawling identified on new bathymetric chart obtained using the EM122). One station, (A7) at the deepest part of our work area in the Kuril-Kamchatka Trench, was planned to be sampled with the MUC and GKG for benthic organisms. Trawling, using EBS and AGT, was attempted, though it could not be done according to the standard protocol, as the cable lenght available on the winch did not reach the needed dimentions (1.5 times the water depth).

Table 1: Deployment (wire) times for the gear used (number of replicates). Work plan and deployment of the gear follows the hour standards used during previous expeditions.

Gear/depth (m)	**5000**	**6500**	**8000**	**9500**
EM122	5.5	6	7	8
CTD	4.5	5	6	7,5
GKG (2) (3 in 9500 m)	9	10	12	16
MUC (2) (3 in 9500 m)	13	14	12	16
EBS (2)	12	13	20	-
AGT (2)	12	13	20	-
Multinet/Plankton net	3	4	4.5	5
total / gesamt (h)	59	65	81,5	52,5
days / Tage	2.5	2.7	3.4	2.2

Table 2: Station areas possitions (depth obtained from GEBCO).

Station	**Latitude**	**Longitude**	**Depth (m)**
A1	45,694	153,582	8165
A2*	45,127	154,27	5037
A3	46,21	153,204	5139
A4	45,522	153,049	8062
A5	44,439	153,204	5011
A6	45,243	152,69	9504
A7	45,35	152,551	7902
A8	45,711	152,276	5009
A9	44,938	151,812	8025
A10	43,82	151,76	5130
A11	44,525	151,21	8048
A12	45,006	150,935	4931

* Station area A2 has been moved into the second transect between areas A8 and A9.

At all areas we have started station work with the deployment of the CTD down to 2000 m for measurements of physical parameters and for calibration of the EM122. After mapping the seafloor we have deployed a multi-plankton-net and used the deployment time to define the areas for the deployment of the corers as well as the waypoints for the deployment of the trawling gear.

It will be possible to test all hypotheses listed in Chapter 4 using the extensive material obtained during the expedition SO250. However, some modifications to the working program were necessary during the cruise for the following reasons:

a. The water depths in the Kuril-Kamchatka Trench, were often deeper than expected from satellite altimetry so that station times which had been calculated as documented according to the depths in table 2 were in fact often much deeper and thus the time spent at the staion was longer than expected.

b. The wire times - when retrieving the gear - took much longer than expected and calculated due to winch problems related to varying diameters of the deep-sea wire used.

c. We had to return to Tomakomai after about 2.5 weeks of expedition due to a case of illness of a crew member who had to be brought to hospital.

These circumstances let to the fact that the shiptime we had available did not allow for the sampling of all planned areas. In a trench system like the Kuril-Kamchatka Trench, the topography is very rough; we can find seamounts, steep slopes, ridges or troughs which might not allow us to deploy towed gear like the epibenthic sledge or the Agassiz trawl in some areas. We therefore need to map the seabed precisely and then - depending on the wind direction and orientation of the vessel -define the spot from which we started to tow these devices. Sometimes we had to slightly deviate from our planned stations as the depths were selected on the basis of the previous incorrect knowledge of the hadal ocean floor. Moreover, for example, in area A6 we planned to sample at a depth of approximately 5100 m. In fact, we had to work in about 6000 m, since we could not find a site that was flat enough to be used for the deployment of the towed equipment. Thus this station took little longer and we needed to compensate for this additional shiptime at later stations where we then had to save time. We therefore decided to skip sampling in area A2, as this station was in the vicinity of abyssal stations sampled during KuramBio I already. At the end of the expedition we decided to place a fourth station area into the second transect at about 6500 m for reasons of comparison. We named this new area A2 in order to have consistency in the numbering of stations areas. On top of that, the A2 area was already referred to in the database. According to this sampling scheme we now have one transect of four station areas (A3, A4, A5, A6) in extension of the Bussol Strait across the KKT, and a parallel transect of four station areas further to the southwest (A8, A2, A9, A10) also across thee KKT. Moreover we have one transect in the middle of the KKT at the deepest depths, consisting of five station areas (A1, A4, A7, A9, A11), two of these are the middle stations of the transects across the KKT. This station setup will allow us to answer our scientific questions and test our hypotheses.

6. Settings of the working area / Beschreibung des Arbeitsgebiets

The Kuril–Kamchatka Trench is an oceanic trench in the northwest Pacific Ocean and extends from the southeast coast of Kamchatka in parallel to the Kuril Island chain to meet the Japan Trench east of Hokkaido. The trench formed as a result of the subduction zone, which formed in the late Cretaceous and has created the Kuril island arc as well as the Kamchatka volcanic arc. The Pacific Plate is being subducted beneath the Okhotsk Plate along the trench, resulting in intense volcanism. These large-scale geomorphologic processes have likely influences the faunal composition of the NW Pacific area and adjacent marginal seas. In our work area the KKT has a maximum depth of about 9700 m. The hydrography of the KKT is complex (Arseniev and Leontieva, 1970). The main hydrological properties are different in the western part of the KKT compared to the eastern part of the KKT. These authors describe the thermohaline characteristics of the water of the Kuril Current. For example surface water temperature ranges from 4-8°C and the salinity between 32.9–33.0‰ at the northwestern side to the direction of the Sea of Okhotsk, whereas in the counter current the temperature ranges from 5-13°C and salinity between 32.6–33.0‰. Deep flows on the slope inshore of the KKT southeast off Cape Erimo, Hokkaido, show that the lower flows (>3000 m) are controlled by the local bottom topography and form in part a southward deep western boundary current (Uehara and Miyake, 1999). Drifter Observations of Anticyclonic Eddies near Bussol' Strait were performed by Rabinovich et al. (2002). These authors discovered and described the characteristics of two large anticyclonic eddies located over the Kuril-Kamchatka Trench using trajectory data obtained from satellite-tracked drifters. These authors report spatial variations in the presence of a warm-core which originated as a Kuroshio ring and propagated to the vicinity of the Bussol' Strait from the south, but also refer to a cold-core eddy which was apparently generated locally near Bussol' Strait by an intensive supply of low potential vorticity water outflowing through the strait from the Okhotsk Sea. For KuramBio II it will be interesting to investigate whether these eddy movements will facilitate migrations of the benthic fauna.

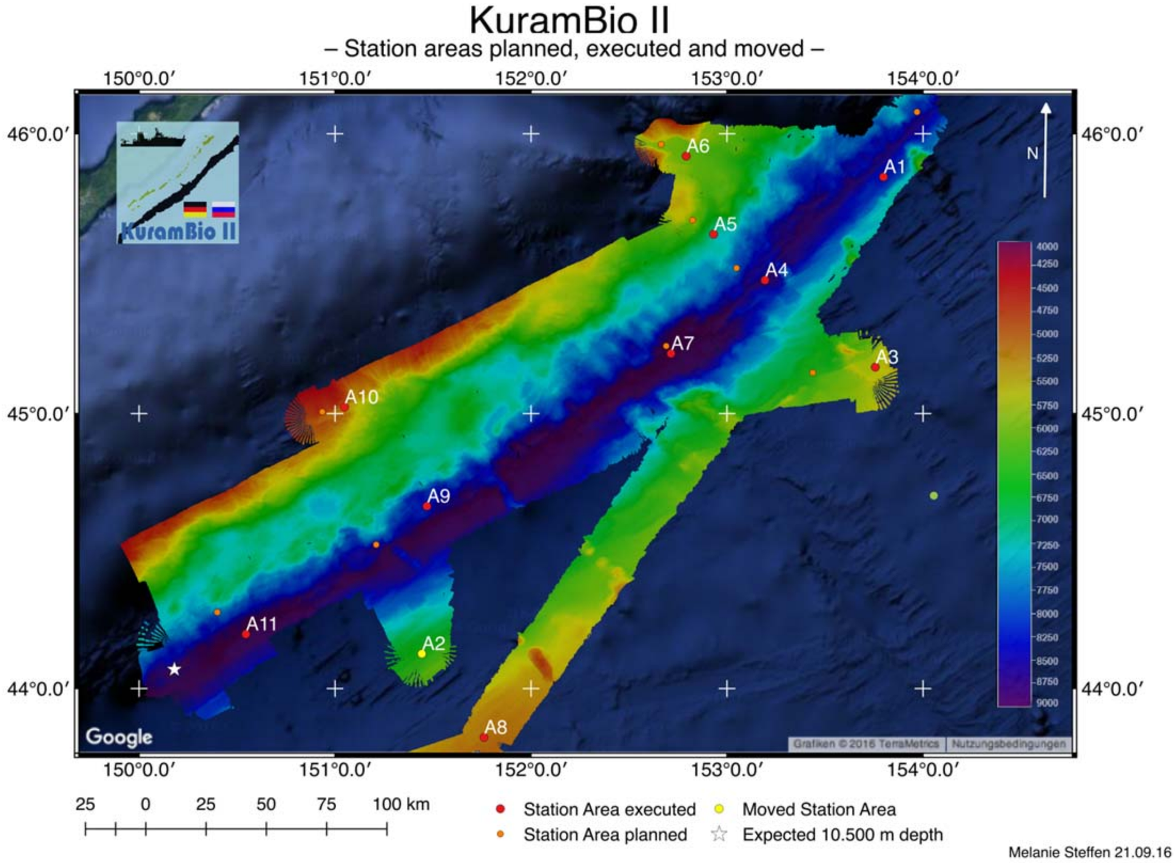

Fig. 2: KuramBio II, station areas planned on the basis of GEBCO data had to be moved to sample the desired depth and to areas, which were flat enough for trawling.

7. Reports from all participants

7.1. Multibeam Mapping

M. Steffen

7.1.1. Acquisition and Processing

During the KuramBio II expedition (SO250) multibeam mapping was executed using the EM 122 echo sounder by Kongsberg Maritime. It measures up to depth of 11,000 m by using an average frequency of 12 kHz (ranging between 10.5 kHz and 13.5 kHz). The opening angle can be set manually to a maximum of 150 degrees. The EM 122 echo sounder is able to generate from 432 to 864 soundings per ping when using Dual Swath mode. Within that the arrays consists of 288 beams with an individual beam width of 0.5° x 1°. The system is connected to a motion sensor, GPS receiver (DGPS: SeaPath 320+ with FUGRO SeaStar as correction receiver) for data positioning and to C-Keel-Sonde (Valeport SVPlus) mounted in the hydrographic funnel.

SIS (Seafloor Information System) software was used for data acquisition. When using the SIS software, the operator is able to choose manually between various views and to adjust settings like ping mode (shallow, medium, deep, very deep and auto), swath angle, spacing of soundings (equidistant), etc. and to bring on a sound velocity profile. Sound velocity was measured by a CTD rosette and the C-Keel-Sonde. The ping rate varies due to the depth. The maximum ping rate achievable is 5 Hz, but the average ping rate during this cruise was 0.03 Hz. The results were saved as Kongsberg RAW data (*.all), which is a format used for post processing.

There is a difference in mapping during the cruise SO250. For transit routes mostly an opening Angle of 120 ° was set to correspond to a speed of 12–13 kn. This allowed only a rough but time efficient mapping during steaming to and between station areas. At the station areas a square of about 25 nm^2 was mapped with an opening Angle of 100° and a speed of 6 kn resulting in more accurate and detailed map. The accurate bathymetry was important for choosing tracks for EBS and AGT deployments. Depending on the depth, the width of the footprint varied from 30 km (deeper areas) to 20 km (shallower areas). The way points and the survey lines were mainly chosen to be parallel to the trench to avoid a narrowing of the footprint due to shallower areas.

The post processing was done by CARIS HIPS and SIPS Software, where the data was checked and corrected by editing outliers. The outliers occurred due to a certain error of the system, where the middle beams seem to shoot into the sediment. This is usually caused by reflections or objects in the water column. After post processing, it is possible to export the swath surface as image (*.tif) and use it in other software such as GIS. In this case QGIS was used to create the maps. For wider overview Google Satellite map was used as a base map and the station areas were added in ascii formats.

7.1.2. Coverage and description

During the SO250 cruise an area of 8,102 m^2 was mapped. It is located in the Russian Exclusive Economic Zone (EEZ), about 43°28’N 149°N 54’E to 46°09’N 154°07’E. The mapping began by arriving to the Russian EEZ and heading towards station area A8. From that point on all transits to the station areas and the areas itself were mapped.

The surveyed area can be described as a polygon on the Kuril-Kamchatka Trench (KKT). The depth of the station areas ranges from about 4,500 m to more than 9,500 m. Jamieson (2015) states that the Vityaz Deep 3 (10,500 m) is also located in this region. The area over the KKT provides a three swath wide ensonification of the seafloor. The bathymetric grid has a final resolution of 100 m. There are also small gaps due to storm conditions and/or errors in the system (sudden wrong measurements of more than 1,000 m difference from neighbouring values appeared).

The surveyed area appears to differ from GEBCO bathymetry. Some inaccuracies were expected as the area was not well mapped in former times. The existing bathymetry data were generated by satellites, which are not as accurate as echo sounders. Therefore the planned station areas had to be relocated to achieve the desired sampling depth (see figure 2, KuramBio II, station areas panned by GEBCO data had to be repositioned to achieve desired depth for sampling).

As the Vityaz Deep 3 was not found where expected, it can be assumed that the former measurements might be inaccurate.

Mapped region is a subduction zone, where the Pacific Plate is subducting beneath the Okhotsk Plate. The seafloor is characterized by the trench with not too steep slopes and seamount-like structures aside. These are ordered perpendicularly. In addition, some straits occur.

7.2. Sampling data management

K. Jeskulke, S. Brix

7.2.1. Sample management

All samples of the KuramBIO II expedition are organized with a digital data management system in MS Access 2010 which includes all the data content produced during the expedition for all gear and purposes (biology, biochemistry, sedimentology, microplastics, bathymetry). In total, we filled 869 single sample jars from 11 areas (106 stations) and sorted these into 3123 inventory numbers on board. The sorting of the ethanol samples from the Kuril-Kamchatka Trench could be nearly finished (preliminary results are presented in Sections 7.) except the latest stations in Area 11, the formalin samples will be sorted at the CeNak, ZMH and in cooperation with the DZMB (German Centre for Marine Biodiversity Research HH and WHV). The complete sorting of samples will be finished most likely in 2018. Specimens are available for specialists on request and provided as loan to work with the specimens before they are finally stored in museum collections.

7.3. Gear deployments

N. Brenke, S. Brix, F. Lejzerowicz, P. Kohnert, M. Bruhn, G. Kamenev, K., Minin

7.3.1. The SBE 32 Carousel Water Sampler (CTD)

The SBE (Sea-Bird Electronics) 32 Carousel Water Sampler equipped with the “SBE 9plus” CTD holds 24 niskin bottles, each holding a volume of 30 liters. Water samples were always taken in 20 m, 60 m, and 150 m depth.

The gear was veered down to a depth of 1100 m and below the mixed surface water layers. For producing detailed maps of the seafloor, the CTD data was used to calibrate the multibeam echosounder (EM 122) for runtime correction. At selected stations the CTD was deployed to 1,500m depth.

Standard deployment:

- Ship on position with 0 kn speed over ground
- Gear to water
- CTD veer with max. 0.3 to 0.5 m/s to 200 m
- Afterwards veer down with 0.8 m/s up to 1,100 m / 1,500 m
- CTD heave up with max. 1 m/s
- on depth level 150 m, 60 m, 20 m two bottles will be closed
- CTD heave up to surface

Table 3: Station list of CTD deployments during SO250.

gear	Area	station	date	depth	Lat_start	Long_start
		SO250_	UTC	[m]	N	E
CTD	A8	1	17.08.2016	2000	43° 49.20'	151° 45.60'
CTD	A1	11	20.08.2016	1000	46° 04.62'	153° 58.20'
CTD	A6	21	23.08.2016	1000	45° 57.73'	152° 39.91'
CTD	A5	32	27.08.2016	1000	45° 41.58'	152° 49.49'
CTD	A4	44	31.08.2016	1500	45° 31.35'	153° 02.82'
CTD	A3	58	08.09.2016	1000	45° 11.00'	153° 36.99'
CTD	A9	72	11.09.2016	1000	44° 31.50'	151° 11.59'
CTD	A2	91	17.09.2016	1000	44° 07.59'	151° 26.58'

7.3.2. The Multi(Plankton)net (MN)

Figure 3: The Multiple-Plankton-Sampler (MPS Maxi combi; Hydrobios GmbH, Kiel, Germany) is made of stainless steel. The dimensions are 1.2 m x 1.2 m x 1.3 m with a weight of 420 kg. The gear shows a quadrate mouth opening of 71 cm width and hight resulting in 0.5 m² effective net opening. The Multiple-Plankton-Sampler was used with five plankton nets of three times 335 µm and two times 100 µm mesh size. When deployed to maximum depth the net interval was 5,900 to 3,000 m (100 µm), 3,000 to 1,000 m (100 µm), 1,000 to 500 m (335 µm), 500 to 250 m (335 µm), 250 to 0 m (335µm). The gear is additionally equipped with CTD sensors (sea & sun) and an oxygen sensor (sea & sun).

Standard deployment:

- Ship on position with 0 kn speed over ground
- unlock tension springs
- switch on Underwater Unit inclusive CTD
- Gear to water
- switch on Deck Command Unit
- MN veer down with max. 0.8 m/s up to max. depth (5,900 m)
- MN heave up with max. 0.5 m/s to surface

Table 4: Station list of MN deployments during SO250.

gear	Area	station SO250_	date UTC	depth [m]	Lat_start N	Long_start E
MSN	A8	3	17.08.2016	5000	43° 49.20'	151° 45.65'
MSN	A1	13	21.08.2016	5900	46° 04.62'	153° 58.24'
MSN	A6	23	24.08.2016	5900	45° 57.72'	152° 39.84'
MSN	A5	34	27.09.2016	5900	45° 41.61'	152° 49.52'
MSN	A4	46	31.08.2016	5900	45° 31.33'	153° 02.91'
MSN	A4	47	04.09.2016	5900	45° 28.76'	153° 11.65'
MSN	A3	60	08.09.2016	5600	45° 09.98'	153° 45.37'
MSN	A9	73	11.09.2016	1000	44° 39.88'	151° 28.10'
MSN	A10	81	14.09.2016	1000	45° 01.35'	151° 02.85'
MSN	A2	93	18.09.2016	1500	44° 06.56'	151° 24.23'
MSN	A11	106	22.09.2016	5900	44° 12.52'	150° 36.30'

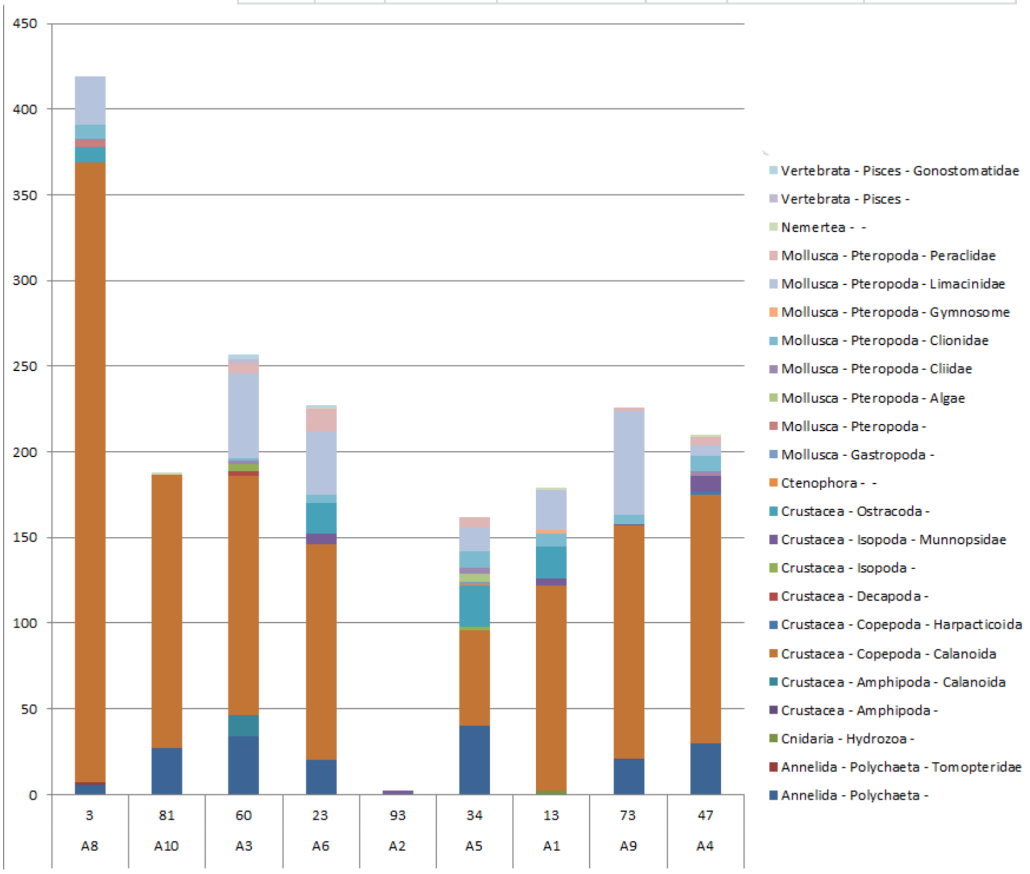

Figure 4: preliminary numbers (n) of supraspecific taxa per station sorted on board from the different MN deployments during the SO250 cruise.

7.3.3. The Box-Corer (BC)

Figure 5: The Box-Corer (Hessler & Jumars 1974) a modified UNSEL Box Corer is made of galvanized steel (OKTOPUS GmbH, Kiel, Germany). The dimensions are 2.1 m x 2.3 m x 2.5 m (L x W x H) with a weight of 1000 kg (net). The box is 50 cm x 50 cm x 60 cm (L x W x H) and has consequently a surface of 0.25 m².

Standard deployment:

- Ship on position with 0 kn speed over ground
- Gear to water
- If required acoustic transponder attached to wire 50 m above BC
- BC veer down with max. 0.5 m/s to 100 m
- Afterwards veer down with 1.5 m/s up to 50 m over ground
- 50 m over ground stop winch
- BC calm down for 1 min. for 6,000 m; or 2 min. for depth greater than 6,000 m
- BC veer down slowly with 0.3 m/s in soft sediments
- BC veer down fast with 0.5 m/s in hard sediments
- BC veer down up to ground contact (check unload in tension recorder signal)
- veer additionally 7 m of wire for 6,000 m; or 10 m wire for depth greater than 6,000 m
- standing time on ground for soft sediments is about 0.5 min
- standing time on ground for hard sediments is about 2.5 min
- after standing time heave up with 0.5 m/s out of the sediment (tension max in tension recorder signal)
- BC heave up with 1.2 m/s to acoustic transponder / up to surface

Table 5: Station list of BC deployments during SO250.

gear	Area	station SO250_	date UTC	depth [m]	Lat_start N	Long_start E
BC	A8	6	18.08.2016	5145.6	43° 49.19'	151° 45.61'
BC	A1	14	21.08.2016	8250.7	45° 50.87'	153° 47.99'
BC	A6	24	24.08.2016	6064.2	45° 55.26'	152° 47.53'
BC	A6	25	24.08.2016	6066.4	45° 55.22'	152° 47.47'
BC	A5	36	28.08.2016	7134.6	45° 38.61'	152° 55.91'
BC	A5	37	28.08.2016	7133.7	45° 38.60'	152° 55.91'
BC	A4	48	04.09.2016	8737.2	45° 28.74'	153° 11.65'
BC	A4	49	04.09.2016	8738.9	45° 28.74'	153° 11.65'
BC	A3	61	08.09.2016	5740.8	45° 10.00'	153° 45.42'
BC	A7	67	10.09.2016	9492.2	45° 12.94'	152° 42.84'
BC	A9	75	12.09.2016	8220.5	44° 39.88'	151° 28.10'
BC	A7	79	13.09.2016	9427.8	45° 12.99'	152° 42.76'
BC	A10	82	14.09.2016	5220.1	45° 01.35'	151° 02.89'
BC	A2	94	18.09.2016	6525.8	44° 06.85'	151° 25.54'
BC	A11	100	20.09.2016	9411.6	44° 12.31'	150° 39.08'
BC	A11	105	21.09.2016	9538.5	44° 12.38'	150° 36.01'

For preliminary information about the faunal composition and animals sorted on board from the different BC samples during SO250 cruise see the BC chapter 7.14.

7.3.4. The Multi-Corer (MUC)

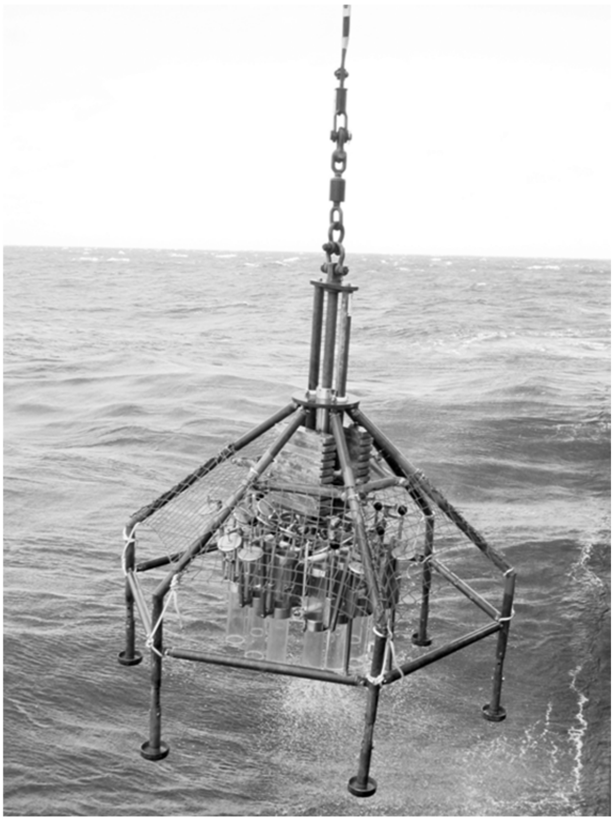

Figure 6: The hexagonal Multi-Corer, a modified Barnett et al. (1984; Version: 2011-K12 x 100; OKTOPUS GmbH, Kiel, Germany) is made of galvanized steel. The dimensions are 1.8 m x 1.8 m x 2.5 m with a weight of 440 kg (net). The gear is armed with twelve tubes, 600 mm long. The tubes show an inner diameter of 95 mm and consequently a surface of 70.9 cm².

Standard deployment:

- Ship on position with 0 kn speed over ground
- Gear to water
- If required acoustic transponder attached to wire 100 m above MUC
- MUC veer down with max. 0.5 m/s to 100 m
- afterwards veer down with 1.2 m/s up to 50 m over ground
- 50 m over ground stop winch
- MUC 1 min calm down
- MUC veer down with 0.5 m/s up to ground contact (check unload in tension recorder signal); soft sediments slowly with 0.3 m/s
- during good weather conditions veer additionally 10 m of wire, during bead weather conditions veer additionally 20 m of wire
- standing time on ground for medium sediments is about ½ min to 1 min
- standing time on ground for soft sediments is less time: 5 sec to 10 sec; hard sediments more time, up to 15 min (!)
- after standing time heave up with 0.5 m/s out of the sediment (tension max in tension recorder signal)
- MUC heave up with 1.2 m/s to acoustic transponder / up to surface

Table 6: Station list of MUC deployments during SO250.

gear	Area	station SO250_	date UTC	depth [m]	Lat_start N	Long_start E
MUC	A8	4	17.08.2016	5143	43° 49.19'	151° 45.59'
MUC	A8	5	18.08.2016	5149	43° 49.19'	151° 45.59'
MUC	A1	15	21.08.2016	8250	45° 50.87'	153° 47.99'
MUC	A1	16	21.08.2016	8250	45° 50.87'	153° 47.99'
MUC	A6	26	25.08.2016	6065	45° 55.23'	152° 47.46'
MUC	A6	27	25.08.2016	6065	45° 55.22'	152° 47.46'
MUC	A5	38	28.08.2016	7138	45° 38.60'	152° 55.91'
MUC	A5	39	29.08.2016	7137	45° 38.60'	152° 55.92'
MUC	A4	50	05.09.2016	8731	45° 28.75'	153° 11.65'
MUC	A4	51	05.09.2016	8734	45° 28.74'	153° 11.65'
MUC	A4	53	06.09.2016	9013	45° 28.76'	153° 11.61'
MUC	A3	62	08.09.2016	5743	45° 09.99'	153° 45.41'
MUC	A3	63	09.09.2016	5743	45° 10.00'	153° 45.43'
MUC	A7	68	10.09.2016	9414	45° 12.93'	152° 42.83'
MUC	A7	69	10.09.2016	9493	45° 12.94'	152° 42.83'
MUC	A9	74	12.09.2016	8226	44° 39.89'	151° 28.11'
MUC	A7	76	13.09.2016	7956	45° 12.94'	152° 42.83'
MUC	A10	83	14.09.2016	5212	45° 01.36'	151° 02.89'
MUC	A10	84	15.09.2016	5214	45° 01.36'	151° 02.89'
MUC	A9	88	16.09.2016	8216	44° 39.90'	151° 28.10'
MUC	A2	95	18.09.2016	6522	44° 06.85'	151° 25.54'
MUC	A2	96	18.09.2016	6515	44° 06.84'	151° 25.55'
MUC	A11	101	20.09.2016	9540	44° 12.40'	150° 36.02'
MUC	A11	104	21.09.2016	9541	44° 12.39'	150° 36.01'

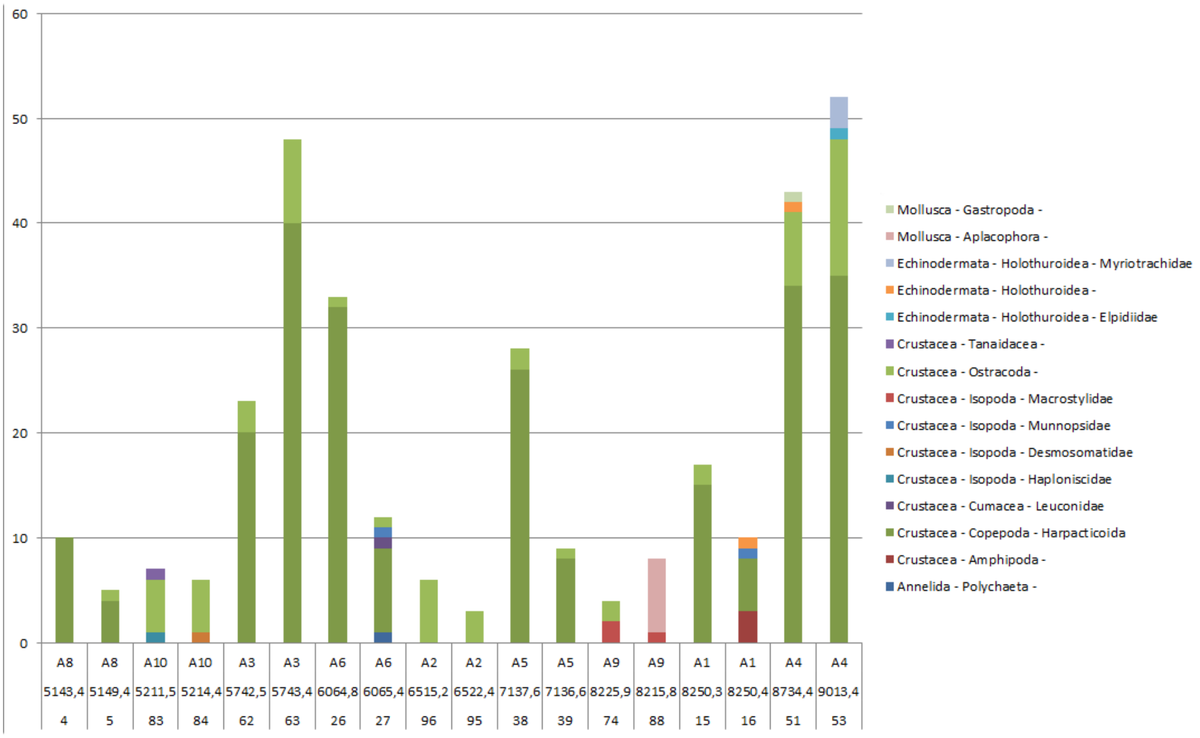

Figure 7: preliminary numbers (n) of supraspecific taxa per station, ordered by depth sorted on board from the different MUC cores during SO250 cruise.

7.3.5. Agassiz-Trawl (AGT)

The AGT (Agassiz 1880; originally: Sigsbee trawl, frequently modified) is made of galvanized steel (OKTOPUS GmbH, Kiel, Germany). The dimensions are 350 cm width x 70 cm x height with a net of 3.5x8.7 m mesh size of 10 mm.

Fig. 8: The Agassiz-Trawl.

Ship distance to “gear on ground positon” in relation to water depth:

4.0 nm / 5,000 m depth

4.5 nm / 6,000 m depth

5.0 nm / 7,000 m depth

5.5 nm / 8,000 m depth

6.0 nm / 9,000 m depth

- Ship speed over ground 1 kn
- Gear to water
- Max. wire length is 1.5 x depth
- AGT veer down with max. 0.5 m/s up to ground contact (check unload in tension recorder signal)
- Veer the rest of wire with 0.5 m/s to max wire length
- winch stop
- Ship go ahead for another 10 to 20 min with speed over ground 1 kn (tighten wire)
- ship stop
- AGT heave up with 0.5 m/s (check increase in tension recorder signal for „start haul“)
- AGT free of ground (check increase in tension recorder signal for „end haul“)
- AGT heave up with 1.0 m/s up to surface

Table 7: Station list of AGT deployments during SO250.

gear	station SO250_	Area	date UTC	depth [m]	Lat_start N	Long_start E	Lat_end N	Long_end E	distance [m]
AGT	7	A8	18.08.2016	5210	43° 49.81'	151° 44.78'	43° 48.07'	151° 48.07'	1440
AGT	9	A8	19.08.2016	5134	43° 48.43'	151° 44.35'	43° 47.64'	151° 44.51'	1518
AGT	18	A1	23.08.2016	8200	45° 50.86'	153° 49.56'	45° 51.95'	153° 51.25'	1825
AGT	20	A1	23.08.2016	8191	45° 51.32'	153° 50.08'	45° 52.20'	153° 51.43'	2571
AGT	29	A6	26.08.2016	6183	45° 56.73'	152° 52.54'	45° 56.57'	152° 54.49'	2180
AGT	31	A6	27.08.2016	6185	45° 56.68'	152° 52.78'	45° 56.54'	152° 54.66'	2224
AGT	41	A5	29.08.2016	7154	45° 39.23'	152° 56.68'	45° 40.11'	152° 58.36'	2219
AGT	43	A5	30.08.2016	7241	45° 38.51'	152° 56.77'	45° 38.51'	152° 58.37'	2592
AGT	54	A4	06.09.2016	8729	45° 28.50'	153° 11.53'	45° 28.12'	153° 10.10'	1710
AGT	56	A4	07.09.2016	8726	45° 29.63'	153° 12.02'	45° 30.08'	153° 10.36'	1934
AGT	64	A3	09.09.2014	5739	45° 09.38'	153° 44.96'	45° 09.99'	153° 46.62'	1880
AGT	78	A7	13.09.2016	9582	45° 13.97'	152° 48.98'	45° 14.48'	152° 47.73'	1272
AGT	86	A10	15.09.2016	5493	45° 00.43'	151° 06.01'	45° 01.37'	151° 06.00'	2000
AGT	90	A9	17.09.2016	8255	44° 40.95'	151° 27.34'	44° 41.99'	151° 26.32'	2398
AGT	98	A2	19.09.2016	6446	44° 05.53'	151° 24.25'	44° 06.25'	151° 25.93'	2280
AGT	103	A11	21.09.2016	9293	44° 12.49'	150° 29.42'	44° 12.50'	150° 37.25'	695

For preliminary information about the faunal composition and animals sorted on board from the different AGT samples during SO250 cruise see the AGT chapter 7.25.

7.3.6. Epibenthic-slege (EBS)

Two different types of EBS were used during the expedition: The B-EBS (Brenke 2005) is a simple mechanical gear, made of stainless steel, 3.6 m x 1.1 m x 1.0 m (L x W x H) with a weight of 570 kg.

The C-EBS (Brandt et. al. 2013) 3.6 m x 1.2 m x 1.8 m (L x W x H) with a weight of 890 kg is additionally equipped with underwater photo- and video devices, auxiliary equipment, and a CTD (SEAGUARD RCM DW). The entire electronic component of the system has a nominal diving depth of 6,000 m (600 bar).

Both EBS are identically equipped with supra- and epibenthic samplers possessing two plankton nets (500 µm) on top of each other leading to two cod ends (300 µm).

Figure 9: The epibenthic sledge.

Ship distance to “gear on ground positon” in relation to water depth:

2.5 nm / 5,000 m depth

3.0 nm / 6,000 m depth

3.5 nm / 7,000 m depth

4.0 nm / 8,000 m depth

4.5 nm / 9,000 m depth

- Ship speed over ground 1 kn
- Gear to water
- max. wire length is 1.5 x depth
- EBS veers down with max. 0.8 m/s up to ground contact (check unload in tension recorder signal)
- Veer the rest of wire with 0.8 m/s to max wire length
- winch stop
- Ship go ahead for another 10 to 15 min with speed over ground 1 -1.2 kn (tighten wire)
- ship stop
- EBS heave up with 0.5 m/s (check increase in tension recorder signal for „start haul“)
- EBS free of ground (check increase in tension recorder signal for „end haul“)
- EBS heave up with 1.3 m/s up to surface

Table 8: Station list of EBS deployments during SO250.

gear	station SO250_	Area	date UTC	depth [m]	Lat_start N	Long_start E	Lat_end N	Long_end E	distance [m]
EBS	8	A8	19.08.2016	5136	43° 49.55' N	151° 46.25' E	43° 48.59' N	151° 46.47' E	1597
EBS	10	A8	20.08.2016	5120	43° 49.43' N	151° 46.96' E	43° 48.45' N	151° 47.17' E	1794
EBS	17	A1	22.08.2016	8191	45° 52.04' N	153° 51.39' E	45° 51.40' N	153° 50.41' E	1645
EBS	19	A1	23.08.2016	8196	45° 52.02' N	153° 51.15' E	45° 51.41' N	153° 50.21' E	1659
EBS	28	A6	25.08.2016	6051	45° 54.43' N	152° 47.02' E	45° 54.52' N	152° 47.20' E	315
EBS	30	A6	27.08.2016	6181	45° 56.38' N	152° 56.70' E	45° 56.83' N	152° 50.93' E	2035
EBS	40	A5	29.08.2016	7081	45° 38.00' N	152° 55.95' E	45° 40.83' N	152° 57.68' E	2691
EBS	42	A5	30.08.2016	7123	45° 39.62' N	152° 56.39' E	45° 40.26' N	152° 57.63' E	2102
EBS	52	A4	06.09.2016	8737	45° 29.77' N	153° 12.16' E	45° 29.18' N	153° 11.13' E	1384
EBS	55	A4	06.09.2016	8745	45° 29.24' N	153° 13.46' E	45° 29.58' N	153° 12.24' E	1496
EBS	65	A3	09.09.2016	5755	45° 09.85' N	153° 43.34' E	45° 10.16' N	153° 44.05' E	1197
EBS	70	A7	11.09.2016	-	45° 13.50' N	152° 49.98' E	45° 13.40' N	152° 49.57' E	-
EBS	77	A7	13.09.2016	9584	45° 13.71' N	152° 51.21' E	45° 14.21' N	152° 49.95' E	1931
EBS	85	A10	15.09.2016	5265	45° 02.26' N	151° 02.14' E	45° 01.64' N	151° 03.68' E	1514
EBS	87	A10	16.09.2016	5492	45° 00.76' N	151° 05.53' E	45° 01.65' N	151° 05.52' E	1398
EBS	89	A9	16.09.2016	8221	44° 40.12' N	151° 27.35' E	44° 39.05' N	151° 27.34' E	2160
EBS	97	A2	18.09.2016	6575	44° 05.68' N	151° 24.88' E	44° 06.94' N	151° 24.88' E	2468
EBS	102	A11	20.09.2016	9545	44° 11.99' N	150° 34.07' E	44° 12.00' N	150° 32.74' E	1626

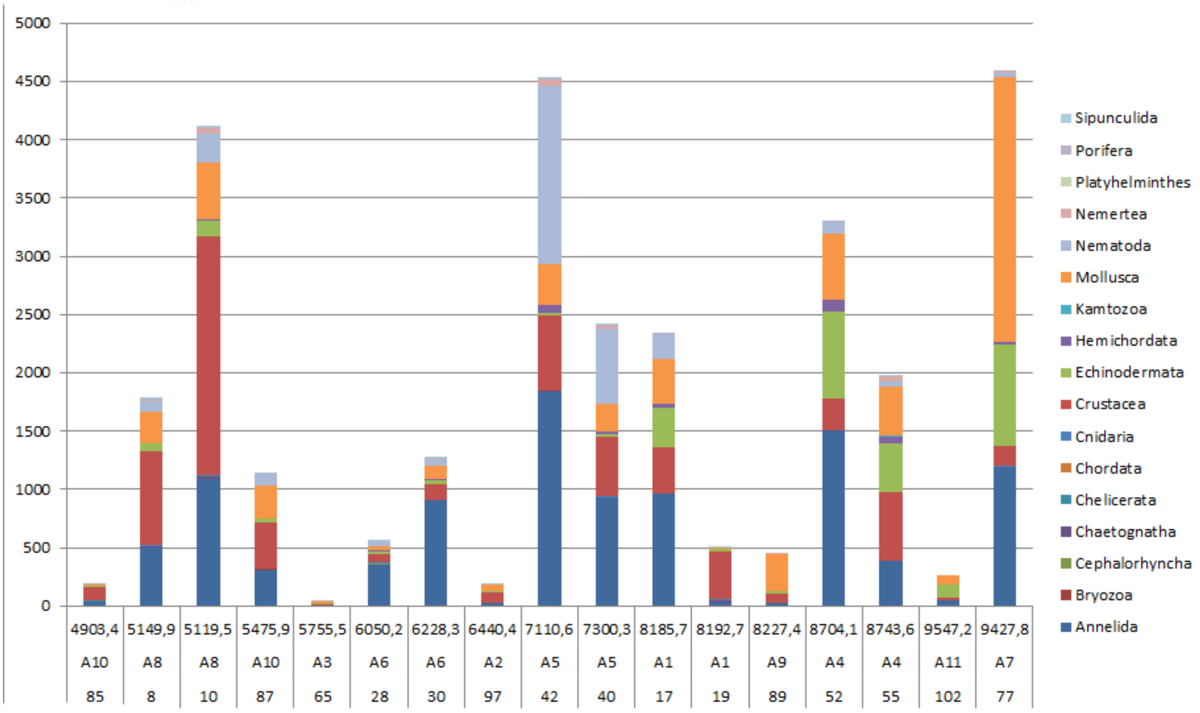

Figure 10: preliminary numbers (n) of supraspecific taxa per station, ordered by depth sorted on board from the different EBS deployments during SO250 cruise.

1.1.1.1. EBS and AGT trawl procedure for stations deeper than 9,000 m

Up to water depth of 8,700 m, the above mentioned method for trawling a gear can be used with the RV Sonne, whileby using the winch as the main device that move the gear over the ground can be used. But for stations deeper than 9000m, due to an inadequate length of the wire with a total work length of 11,000 m, it is necessary to use additionally the ship itself for trawling the gear.

After 11000 m of wire was payed out, the ship was moving with 0.5 kn for 60 min. This gave an additional trawl distance of half of a nautical mile (925 m).

1.1.1.2. EBS and AGT trawl distance calculation

The trawl distances were calculated by the signal of the tension meter and the wire length. At the moment the EBS started to move, in the beginning of the trawl, the tension meter showed an increase in weight (approx. 5 kN). The moment the EBS left the ground, at the end of the trawl, the tension meter showed another increase in weight (approx. 5 kN). The wire lengths at the time of the increases were noted. The difference between the wire length values indicated the trawl distance.

The EBS speed over ground is 0.5m/s. The signal at the moments of increasing weight was approximately 1 min. in length, respectively 30 m of wire (0.5 % for 6,000 m wire). Additionally, the used steel wire comprised an elongation of 0.5 %/1,000 m (2–5.5% for 4,000–11,000 m wire). Accordingly the maximum error rate of 6 % for this trawl distance calculation method can be mentioned.

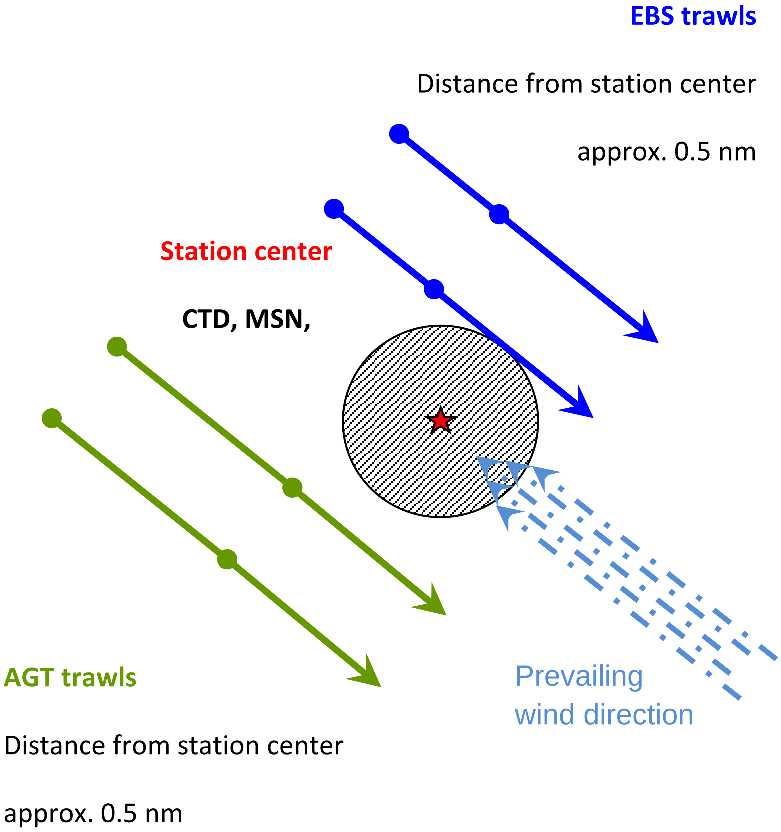

Fig. 11: Illustration of the ideal arrangement of the gears around the stations during the expedition SO250, as far as practicable regarding wind, current and bottom topography. Colors indicate in red: station center; dark blue: EBS trawls; green: AGT trawls; light blue: wind direction.

7.4. Results of the CTD (Conductivity, Temperature, Density) rosette

F. Lejzerowicz, J. Stehlíková, M. Steffen, U. Minzlaff

7.4.1. Objectives

The CTD has been deployed first at every station for both practical and scientific purposes. First, some physico-chemical parameter values were acquired to calculate the sound velocity profile in the upper water column. Sound velocity changes strongly affect the performance of the multibeam echosounder, which provides information about the depth, topography and roughness of the seafloor areas where sediment sampling gears are to be deployed. Hence, *in situ* estimations of local sound velocity profiles are necessary to refine the station plan. The sound velocity in the upper water layers is highly influenced by temperature and salinity, which may exhibit anomalies down to hundreds of meters depending on the width of the mixed layer. Second, water samples from different depths were collected in Niskin bottles in order to understand the role of the bentho-pelagic coupling and to investigate the importance of particulate organic matter of the surface water layers as a food source for the deep-sea communities.

Table 9: CTD deployments coordinates.

Station	Area	Date	Time	CTD depth (m)	Latitude	Longitude	Depth (m)
SO250_1-1	A8	17/08/16	17:35:38	2000	43° 49,197' N	151° 45,607' E	5144.4
SO250_11-1	A1	20/08/16	19:20:53	1000	46° 4,613' N	153° 58,210' E	8126.8
SO250_21-1	A6	24/08/16	13:41:12	1000	45° 57,743' N	152° 39,914' E	5958.3
SO250_32-1	A5	27/08/16	18:24:35	1000	45° 41,576' N	152° 49,491' E	6040.1
SO250_44-1	A4	31/08/16	03:49:45	1500	45° 31,356' N	153° 2,821' E	7757.6
SO250_58-1	A3	08/09/16	05:11:01	1000	45° 11,004' N	153° 37,003' E	5952.6
SO250_72-1	A9	11/09/16	21:28:07	1000	44° 31,506' N	151° 11,605' E	8392
SO250_91-1	A2	17/09/16	21:29:21	1000	44° 7,620' N	151° 26,583' E	6547

7.4.2. Work at sea

The CTD was always deployed first at eight stations (Table 9). One crew member only was required to bring the CTD rosette out at sea, directly from the hangar side door (Figure 12). Electrical power is sent to the gear only once the crew member released the gear for obvious security reason (the current is also stopped before manual retrieval). The rosette hosts 24 Niskin bottles and the set of probes measuring salinity, temperature and others parameters (e.g. fluorescence, pressure, etc). The deployment starts by lowering the CTD to a water depth of 10 meters where the gear is secured from bumping on the ship's hull. Then the real-time data acquisition program is started and once it signals that the probes pump are operational, the gear if heaved up to a water depth of 4 meter, where the multibeams are located. Here, the real-time data acquisition is stopped and re-started, and then the gear is lowered at 0.3-0.5 m/sec for the first 200 m of cable, and with 0.7 m/sec to a CTD depth (Table 1) defined by the practical and research purposes. Here, the real-time data acquisition is stopped, the raw acquired data is copied on a separate hard-drive for bathymetric analyses, and the real-time acquisition program is started again. The heaving of the gear is then conducted with a cable speed of 1 m/sec, and stopped at water depths of 1,000, 150, 60 and 20 meters for water sampling. A total of two bottles were closed at each depth in case of failure. All CTD deployments were successful, with accurate downward measurements (i.e. consistent with the Multinet CTD measurements), enough water volume collected for sampling, and without damage to the equipement.

Figure 12: CTD rosette equipped with probes and Niskin bottles.

7.4.3. Preliminary results

The Niskin bottles containing the water samples were dedicated to food-web analyses. Ulrike Minzlaff extracted c.a. 5 liters of water using plastic tubes mounted on the dedicated apertures located at the bottom of each Niskin bottles in order to fill buckets. The water was filtered with a vacuum pump through precombusted (400°C for 4h) 47 mm GF/C filters in the cooling room (4°C) and stored at -80°C.

Example values for i) the surface water (shallowest measured depth), ii) the c.a. 100-meter layer and iii) the deepest depth measured of each station are given in Table 10.

Table 10: Example values for few parameters for three depths across the water column.

Station	Area	Depth (m)	Temperature (°C)	Conductivity (S/m)	Oxygen (V)	Sound Velocity (m/s)
SO250_1-1	A8	5.306	14.805	3.994557	3.1173	1503.18
		100.006	1.4193	2.87956	4.5684	1454.53
		2004.173	1.7011	3.118535	1.8875	1489.99
SO250_11-1	A1	6.578	13.7856	3.890061	2.8193	1499.76
		100.009	1.5042	2.882641	4.6673	1454.82
		1000.907	2.7186	3.140045	1.0365	1476.96
SO250_21-1	A6	5.222	11.8757	3.72737	3.2039	1493.42
		100.005	1.6976	2.911164	4.3275	1455.9
		991.126	2.7917	3.143023	0.986	1477.07
SO250_32-1	A5	5.84	12.2106	3.76061	3.4408	1494.52
		100.014	1.3211	2.877644	4.4595	1454.19
		995.835	2.9354	3.152747	1.0066	1477.72
SO250_44-1	A4	5.996	10.3223	3.575264	3.2051	1486.81
		100.027	1.2964	2.877768	4.2811	1454.12
		1472.827	2.3305	3.135668	1.1208	1483.41
SO250_58-1	A3	5.93	14.6554	3.955719	2.7827	1502.43
		100.035	1.8771	2.924791	4.2227	1456.67
		983.996	2.7211	3.13695	0.9225	1476.65
SO250_72-1	A9	8.373	14.6105	3.97129	3.1807	1502.54
		100.03	1.613	2.897689	4.3643	1455.42
		1005.484	2.5371	3.125721	1.0291	1476.26
SO250_91-1	A8	6.531	16.6845	4.168044	1.6923	1509.07
		10.073	16.6929	4.169612	2.7986	1509.16
		1004.553	2.5398	3.128436	1.0445	1476.31

As shown by the CTD profiles (temperature, salinity, oxygen saturation), the biggest differences between stations are in the upper layer (Figures 2-4). Notably, stations A3 and A6 are less saline. In general biggest differences are in the upper 100 – 600 m. The stations located near to the Bussol Straight differ in salinity, temperature and oxygen content (A3 to A6). This could be a result of the influence of colder and fresher waters from the Sea of Okhotsk, which have also higher oxygen content (Itoh 2003).

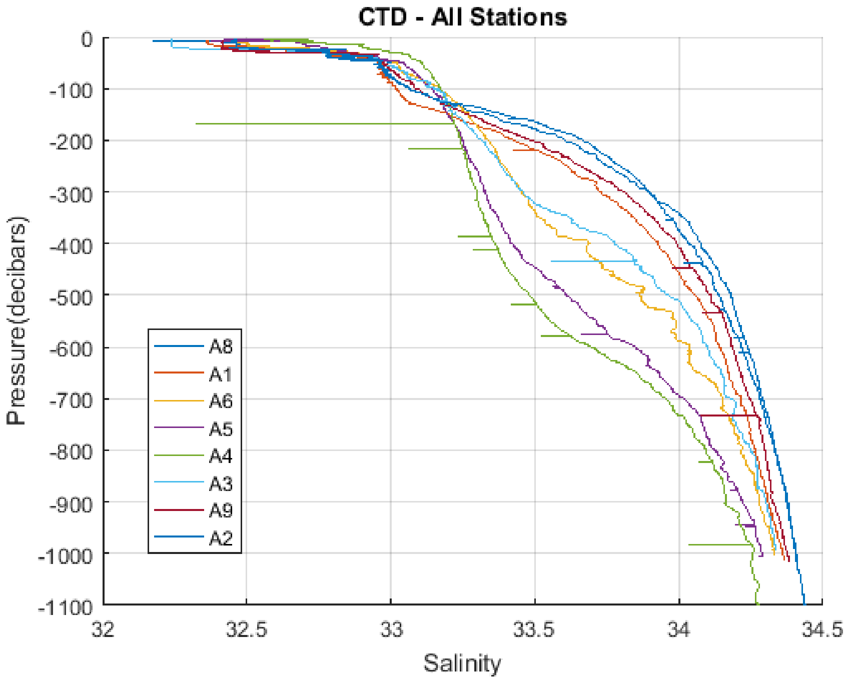

Figure 13: CTD salinity profiles © Jiřina Stehlíková.

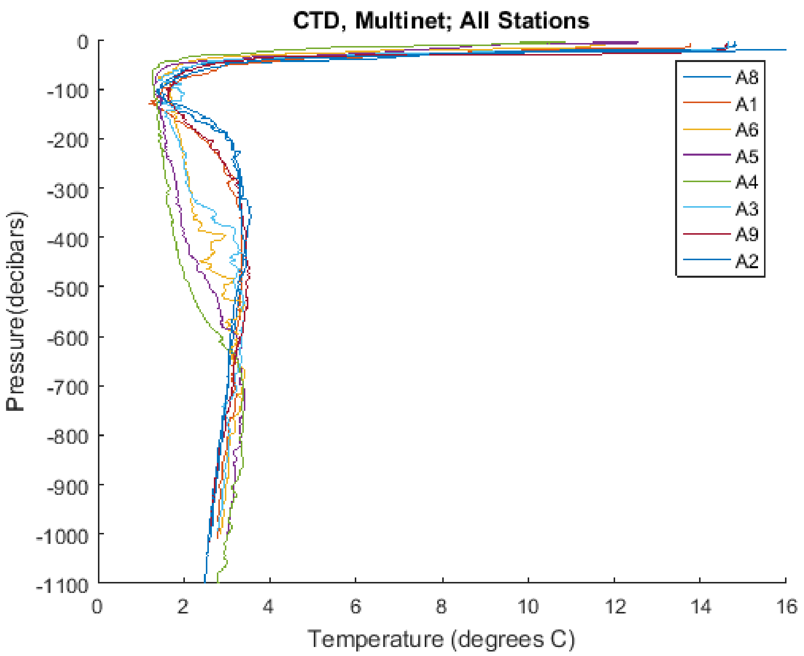

Figure 14: CTD temperature profiles © Jiřina Stehlíková.

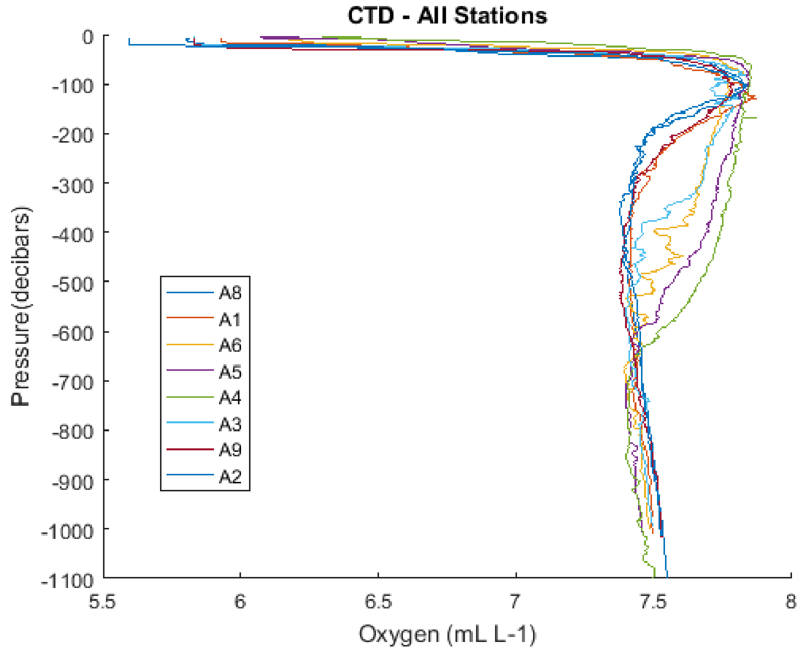

Figure 15: CTD oxygen profiles © Jiřina Stehlíková.

7.5. Plankton in the Kuril-Kamchatka area by use of MultiNet - Multiple Plankton Sampler

C. Schmidt, P. Kohnert, N. Gatzemeier

The MultiNet (Fig. 7.5.1) consists of a deck control unit and an under-water unit (Uwu). The deck control unit was connected to the on-board-computer with installed "Ocean Lab Software" and allowed remote subsequent opening of different nets from maximum depth to the surface. Additionally, the Uwu was equipped with an "Optical Dissolved Oxygen Sensor" and a standard CTD (Sea & Sun Marine Tech), which recorded dissolved oxygen, conductivity and temperature of the respective depths.

7.5.1. Objectives

We aimed to study the plankton composition at the different station and in different water depths and to use some of the material for biochemical investigations.

7.5.2. Work at sea

In total we sampled eleven stations using 3–5 nets of different mesh sizes (335 µm and 100 µm) and appropriate net bags. Exclusively vertical hauls from starboard were conducted. The obtained samples were transferred from the cod ends into plastic buckets and were sorted in a room which was climated to 4 °C.

7.5.3. Preliminary results

Sorted material (polychaetes, nemerteans, copepods, molluscs, ostracods, jellyfish, fish) (Fig. 16) was determined to the best possible taxonomic level and will be used by various experts for morphological, genetic and biochemical analyses.

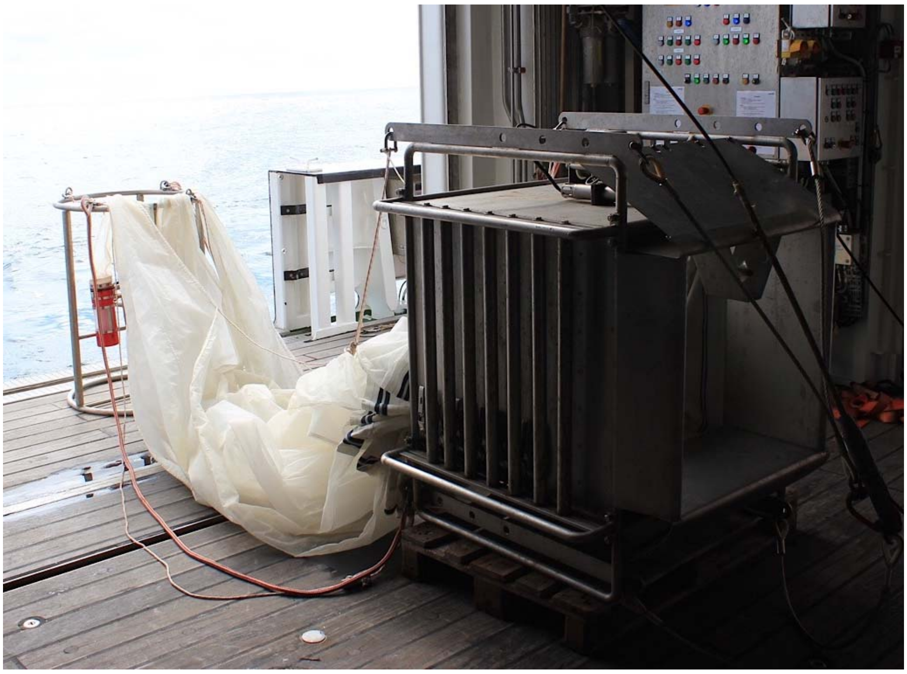

Fig. 16: MultiNet ready for deployment. © P. Kohnert.

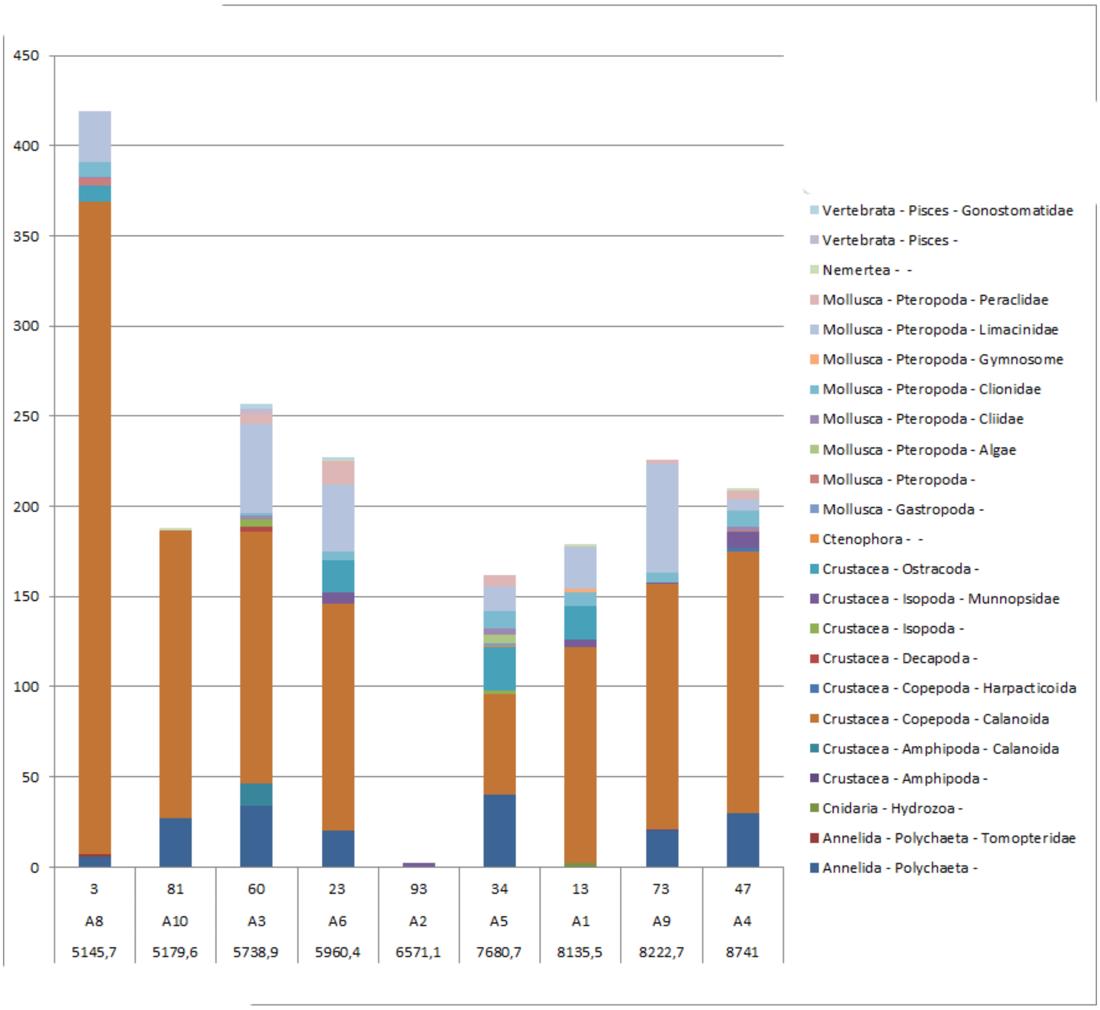

Fig. 17: sorted taxa from the MSN during live picking on bord at 4°C.

7.6. Pteropoda of the Kurile-Kamchatka Trench area

P. Kohnert

7.6.1. Objectives

Pteropods are holopelagic euopisthobranch gastropods that can, depending on seasonal influences, constitute large part of the zooplankton biomass (Comeau *et al*., 2009) and thus are an important food source for a variety of organisms. The majority of marine gastropods are benthic animals and possess a foot to crawl over the ocean floor. Pteropods, in contrast, had modified part of the foot into clearly defined swimming appendages which they use for locomotion in the water column. These so called "wings" are the characteristic feature of Pteropoda, which consist of three subgroups that differ remarkably in their external morphology. Euthecosomata possess an outer aragonitic shell, while most Pseudothecosomata have a reduced or internal shell. Gymnosomata are (with exception of a very early, embryonic shell which is discarded soon after hatching from the egg) completely shell-less and feed exclusively on specimens of the two before mentioned groups.

Since thin shells of some Thecosomata (in particular of the genus *Limacina*) have been shown to be vulnerable to ocean acidification, these organisms are recently used as bioindicators (Bednarsek *et al*., 2015). Most anatomical information on pteropod species dates back to the 19th and the beginning of the 20th centur; and genetic approaches to reveal relationships and exact number of species are hampered by a limited geographical sampling range (Corse *et al*., 2013; Maas *et al*., 2014). A taxonomical revision based on an integrative morphological/genetical approach for this group is urgently needed. Also, geographical distribution of species needs to be further investigated to monitor potential future shifts driven by ocean acidification and/or global warming.

7.6.2. Work at sea

Pteropod samples were obtained from every of the MSN hauls as described in the gear deployment section (7.1) except for station SO250_46, which had to be aborted. Specimens were sorted in a climate room at 4°C macro- and microscopically. Animals were identified at least to the genus level and fixed in EtOH 96% or RNA later for genetic investigations and 4% formalin solution for histological comparison.

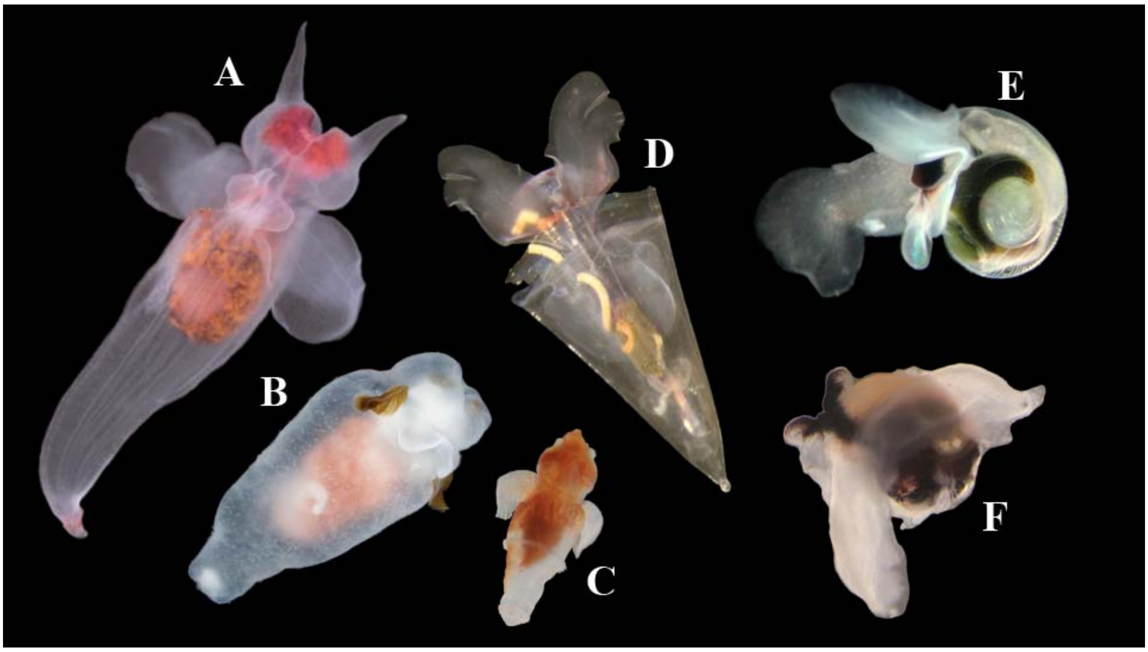

Figure 18: Examples of pteropods obtained from the Multinet during Kurambio II: A: *Clione limacina* (adult specimen); B: unidentified gymnosome *spec.*; C: *Clione limacina* (juvenile); D: *Clio spec.* E: *Limacina helicina*; F: *Peracle spec.*

7.6.3. Preliminary results and outlook

Seven species belonging to 6 different families were sampled during the Kurambio II cruise.

Table 11: taxonomic composition of the pteropod taxa sampled.

Clade	Euthecosomata	Pseudothecosomata	Gymnosomata
species	*Limacina helicina*	*Peracle spec.*	*Clione limacina*
	Limacina spec.		*Thliptodon spec.*
	Clio spec.		*Gymnosome spec.*
∑ species	3	1	3

A total number of 478 specimens were picked and fixed on board, with *Limacina* species being most abbundant comprising 74.5 % of sampled specimens.

DNA will be extracted at the Bavarian State Collection of Zoology (ZSM Munich) and species level identification will be done by genetic barcoding. Standard genetic markers (COI, 16S, H3, 18S, 28S) will be amplified and implemented in a dataset from all known pteropod species to reconstruct phylogenetical relationships of the implemented taxa.

One gymnosome species (*Gymnosome spec*., see Fig 18B) is undescribed and new to science. Additionally to the genetic identification, the obtained specimen will be serially sectioned and reconstructed in 3D in order to perform a state of the art species description.

7.7. Planktonic Copepoda in the Kuril-Kamchatka area

C. Schmidt

7.7.1. Objectives

Copepoda are one important link in the marine food web and properly the biggest group of diatom grazer (Rae & Rees, 1947). Because of this central role in the food web many studies of the biochemical composition were conducted.

Trophic relationships can be examined by use of marker lipids of organisms, which pass the foodweb nearly unchanged. For this purpose, modern gaschromatic techniques can be used (Sargent & Whittle, 1981, Kattner et al., 2007). The fatty acids 16:1 and 20:5 e.g. are typical for diatoms (Kates & Volcani, 1966), whereas 18:4 and 22:6 are indicators for dinoflagellates and the algae *Phaeocystis* spp. (Harrington et al. 1970, Sargent et al. 1985). 14:0, 16:0 and 18:1 (n-9) are markers which were found in ciliates (Arts, Brett & Kainz, 2009, Peters et al., 2006).

Stable isotopes are also suitable markers which can be used for food web analysis by detecting pathways of organic matter in biological systems (e.g. Minagawa & Wada 1984, Michener & Schell 1994, Hobson 1999, Peters et al. 2005). The stable isotope ratios of carbon and nitrogen shall be determined to detect differences in trophic signals.

In contrast to stomach content analyses, stable isotopes and fatty acid marker techniques provide information on dietary assimilation over longer time periods (Fry, 1988, Rau et al., 1992, Dahl et al., 2003, Dalsgaard et al., 2003).

Following questions should be addressed: Are there differences in the fatty acids composition and stable isotope signatures of the Copepoda at the different depths and at different longitude/latitude?

Which typical pattern of fatty acids can be found within the Copepoda?

7.7.2. Work at sea

During KuramBio II, more than 1300 Copepoda from eleven stations and different depths (0–250, 250–500, 500–1,000, 1,000–3,000, 3,000–max. 5,900 m) were taken to study their food sources (by use of lipids and stable isotope techniques). After sorting of Copepoda material from the multinet, the samples were frozen immediately at -80 °C. The remaining plankton samples were fixed with ethanol, which can be used for genetic and morphological identification of the animals. The identification of the animals will be conducted in the home laboratory in Wilhelmshaven and the food analyses in cooperation with the University of Hamburg.

7.8. Multicorer (MUC) deployments and distribution of samples

P Martinez Arbizu, N. Mercado Salas, A.S. Petrunina, H.M. Yoo, H. Tanaka, V. Mordukhovich, F.H. Lejzerovicz; T. Cordier, I.H. Int-Veen, J. Stehlikova, V. Sattarova, U. Minzlaff, A.S. Maiorova, M. Bruhn, C. Schmidt

7.8.1. Gear description

The Multiple Corer (multicorer, MUC) (Fig. 20) is a gear designed for taking meiofauna as well as sediment samples (Barnett et al. 1984). The employed multicorer is equipped with twelve transparent acryl-glass-cylinders (tubes), each 62 cm in length, so the MUC provides up to 12 parallel undisturbed sediment samples per each deployment. Each tube has an outer diameter of 99 mm, and an inner diameter of 94 mm. Consequently; the surface of sediment sample taken with one tube covers an inner area of 69.4 cm². During the expedition, 24 deployments (3 of them unsuccessful) on 11 areas took place, retrieving a total of 243 corers. On Area 7 the multicorer did not provided any sample. The sediment was so compacted that the corers didn't penetrate into the sediment. A boxcorer was used instead to provide some sediment samples (Fig 21). The locations of all deployments are given in the table 12.

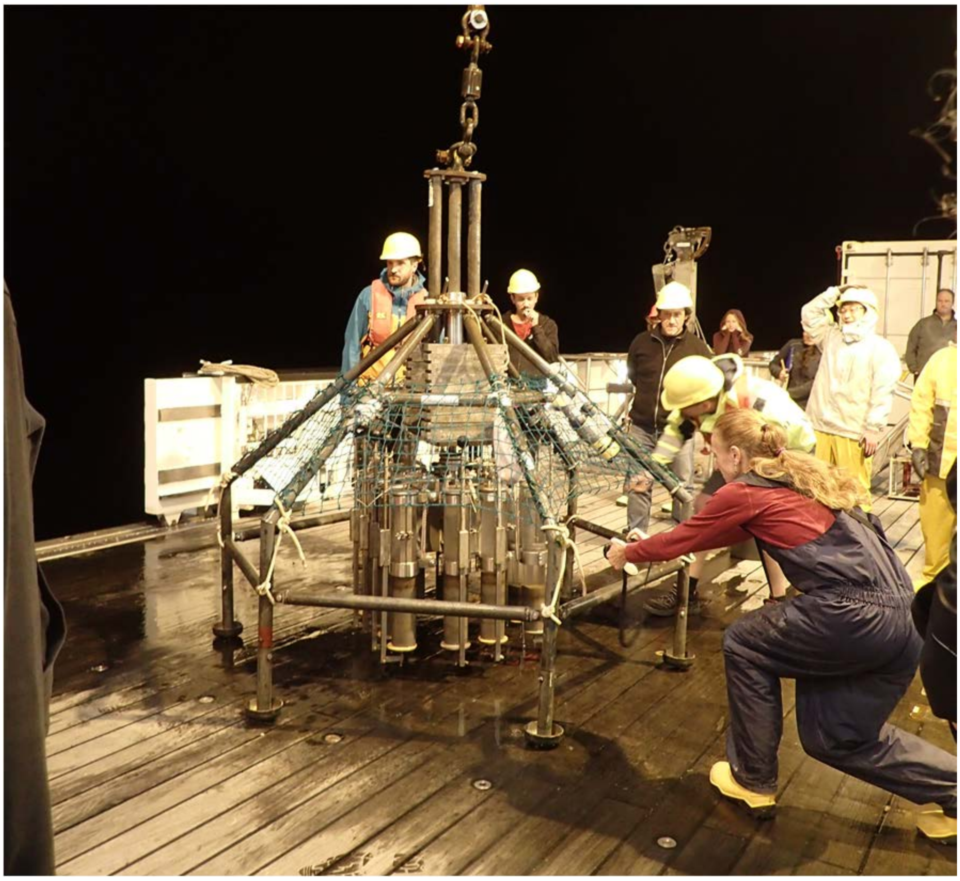

Figure 20: The multicorer after sampling the station 104 at 9540 m depth. Photo taken by: Hiroaki Fukumori.

1.1.1. Deployment procedure

The multicorer was deployed from starboard. The regular deployment starts with lowering at 0.3–0.5 m/sec for the first 50 m of cable. After that lowering was continued with 1.2 m/sec to app. 50 m above the seafloor, where the winch stopped and the MUC remained standing during 1–2 min. Then it was lowered, with 0.5m/sec until the landing on the bottom. When the MUC touched the bottom, 8 m of cable were released. The MUC stayed for 3–15 minutes on the bottom depending on sediment characteristics. On hard very compacted sediments the MUC stayed longer at the bottom. Heaving normally started with 0.5 m/sec, and after the gear was free from the bottom, heaving was continued with 1.2 m/sec.

Table 12: Coordinates, depth and date of deployments

gear	station	Area	stationdate	depth_start (m)	Lat_start	Long_start
MUC	4	A8	17.08.2016	5143,4	43° 49.19' N	151° 45.59' E
MUC	5	A8	18.08.2016	5149,4	43° 49.19' N	151° 45.59' E
MUC	15	A1	21.08.2016	8250,3	45° 50.87' N	153° 47.99' E
MUC	16	A1	21.08.2016	8250,4	45° 50.87' N	153° 47.99' E
MUC	26	A6	25.08.2016	6064,8	45° 55.23' N	152° 47.46' E
MUC	27	A6	25.08.2016	6065,4	45° 55.22' N	152° 47.46' E
MUC	38	A5	28.08.2016	7137,6	45° 38.60' N	152° 55.91' E
MUC	39	A5	29.08.2016	7136,6	45° 38.60' N	152° 55.92' E
MUC	50	A4	05.09.2016	8731,1	45° 28.75' N	153° 11.65' E
MUC	51	A4	05.09.2016	8734,4	45° 28.74' N	153° 11.65' E
MUC	53	A4	06.09.2016	9013,4	45° 28.76' N	153° 11.61' E
MUC	62	A3	08.09.2016	5742,5	45° 09.99' N	153° 45.41' E
MUC	63	A3	09.09.2016	5743,4	45° 10.00' N	153° 45.43' E
MUC	68	A7	10.09.2016	9413,5	45° 12.93' N	152° 42.83' E
MUC	69	A7	10.09.2016	9492,8	45° 12.94' N	152° 42.83' E
MUC	74	A9	12.09.2016	8225,9	44° 39.89' N	151° 28.11' E
MUC	76	A7	13.09.2016	7956,1	45° 12.94' N	152° 42.83' E
MUC	83	A10	14.09.2016	5211,5	45° 01.36' N	151° 02.89' E
MUC	84	A10	15.09.2016	5214,4	45° 01.36' N	151° 02.89' E
MUC	88	A9	16.09.2016	8215,8	44° 39.90' N	151° 28.10' E
MUC	95	A2	18.09.2016	6522,4	44° 06.85' N	151° 25.54' E
MUC	96	A2	18.09.2016	6515,2	44° 06.84' N	151° 25.55' E
MUC	101	A11	20.09.2016	9539,8	44° 12.40' N	150° 36.02' E
MUC	104	A11	21.09.2016	9540,9	44° 12.39' N	150° 36.01' E

Fig 21: In area 7 the sediment samples were retrieved from the boxcorer. © Hiroaki Fukumori.

7.8.2. Distribution of samples

Multicorer samples were distributed among six research groups. From each deployment, tubes were taken for biodiversity studies, genetics, biochemistry, sediment analyses and taxonomic studies (protists, foraminiferans, nematodes, copepods). The exact distribution and fixation at every deployment can be found in table 13.

Table 13: Multicorer deployment, distribution and fixation of tube samples.

Station	Abiotics	Foraminifera	Meio-fauna	Meta-barcoding	Micro-plastics	Ostra-coda	Sedimen-tology	Biochemistry	Microbio-logy
4	3	2	3	1	1	1	1	1 spoon/	1 spoon
5	1	2	4	3	2	1	1	1 spoon/	1 spoon
15	3	2	3	2	1	1	1	1 spoon/	1 spoon
16	1	2	3	3	1	1	1	1 spoon/	1 spoon
26	3	2	3	2	1	1	1	1 spoon/	1 spoon
27	1	2	3	3	1	1	1	1 spoon/	
38	2	2	3	2	2	1	1	1 spoon/	1 spoon
39	1	2	3	3	2	1	1	1 spoon/	1 spoon
51	2	2	3	2	1	1	1	1 spoon/	
53	1	2	4	2	1	1	1	1 spoon/	1 spoon
62	2	2	3	2	1	1	1	1 spoon/	
63	1	2	5	1	1	1	0	1 spoon/	1 spoon
74	2	1	3	2	1	2	1	1 spoon/	1 spoon
83	2	2	3	2	1	1	1	1 spoon/	1 spoon
84	0	2	3	3	1	1	1		
88	1	2	4	2	0	1	1	1 spoon/	1 spoon
95	3	2	2	3	1	1	1	1 spoon/	1 spoon
96	0	2	5	1	1	1	1	1 spoon/	1 spoon
101	2	2	5		1	1	1	1 spoon/	1 spoon
104	1	2	1	5	1	1	1	1 spoon/	1 spoon
SUM	**32**	**39**	**66**	**44**	**22**	**21**	**19**		

7.9. Micropaleontology and biogeochemistry based on MUC samples

V. Sattarova, J. Stehlíková

7.9.1. Objectives

One objective ofthis study is to restore the conditions of the natural environment and climate of the North-West Pacific (hydro-chemical processes, depositional environment, and productivity) through the study of modern deep-sea sediments. Obtaining complete and reliable information about the environment conditions through the use of complex lithophysical (determining of the humidity and density of the sediment, magnetic susceptibility, grain composition), geochemical (definition of chemical composition (macro- and microelements, REE, organic carbon and biogenic silica of the sediment) and micropaleontological (diatom and other analyses) methods. The diatoms as primary producers are useful in biostratigraphy and paleoceanography. They are one of the most informative microfossils for paleoreconstructions regional and global climate events. Diatoms can be used as indicators of environmental parameters. The quantitative ratios of diatoms species reflect the conditions of the surface water (e.g., salinity, temperature, ice conditions, currents, and abundance of nutrients).

Another objective is to investigate modern sedimentary deposition in the Kuril-Kamchatka trench and slopes as well as the sediment characteristic important for benthic and epibenthic ecosystems. The benthic fauna has in return an important influence on sediment dynamics and remineralisation.

Among the factors controlling sedimentation in the deep sea, primary productivity in the overlying waters, hydrodynamics and proximity to the land (terrestrial sedimentary input) play very important roles. Literature shows that trench axis can receive more material than expected from primary productivity in overlying waters due to hydrodynamics (Turnewitsch et al, 2014). Excess ^{210}Pb ($^{210}Pb_{xs}$) approach can be used to investigate recent sediment dynamics, accumulation and also can be used to estimate bioturbation in the sediment (Turnewitsch et al, 2000, Calvalho et all, 2011). The naturally occurring particle reactive radionuclide ^{234}Th with short half-live of 24.1 days (daughter product of soluble and conservative ^{238}U) is widely used for fluxes estimation in the water column (Buesseler, 1998), fluid dynamics (Peine et al, 2009) or investigation processes in the surface of sediments (Turnewitsch, 2001) and can be complimentary to the $^{210}Pb_{xs}$ approach.

Microbial activity in the sediments is a very important factor for breakdown of organic matter (Glud, 2013); however, the knowledge about microbial communities in the deep sea is scarce especially at hadal depths. Viruses are abundant in deep sea sediments and may play an important role in mortality of prokaryotic cells (Engelhardt et al, 2014). Even though the viral abundance decreases with the depth of sediment, they were found as deep as 320cm underneath the sediment surface. The presence of viruses in the sediment can be used as an indicator for microbial life (Engelhardt et al, 2014).

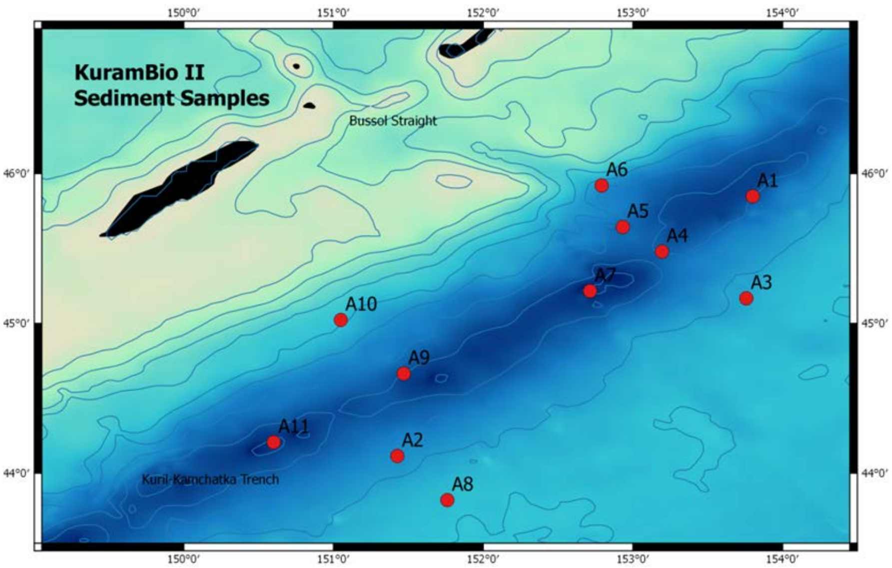

Figure 22: Map of MUC sites.

7.9.2. Methods to be used for further investigations in the laboratory

Grain composition of the sediment will be analysed with aid of the laser particle size meter "Analysette 22"; the content of total organic carbon will be measured by a "TOC-V_{CPN}" analyzer with an SSM-5000A attachment for the incineration of solid samples; the total chemical analysis of the sediments will be analyzed using the ICP-AES method using iCAP 6500Duo (Thermo Electron Corporation, USA) and ICP-MS using a quadrupole mass spectrometer Agilent 7500 c (Agilent Technologies, USA), as well as using the method of the high-resolution X-ray fluorescence scan with aid of ARL QUANT'X spectrometer; the quantitative contents of diatoms and their species composition were determined in the surface sediments and in the cores (every cm); we will analyse diatom assemblages and diatom accumulation rates across the study area and group diatom taxa into ecological niches based on the literature and statistical methods.

Measurements of water content, porosity and dry bulk density will be performed primarily on each slice from the 19 cores assigned for $^{210}Pb_{xs}$ analysis. $^{210}Pb_{xs}$ will be measured from dried, homogenised sediment at SAMS using germanium gamma detectors (Canberra and/or Ortec) as described by Glud et al (2013) and Trunewitsch et al (2014). POC/PN analysis will be measured at SAMS following method described by Verardo et al (1990), with some modifications. The sediment samples collected within the last two weeks of the cruise will be used for ^{234}Th analysis. The upper 6 one-centimetre slices were subsampled and the excess ^{234}Th will be measured from filtered dried and homogenised sediment using Risø GM25-5A beta multicounter as soon as possible after collection.

The sediment samples for grain size analysis will be disaggregated by adding aqueous sodium hexametaphosphate solution and the sediment slurry will be measured using laser diffractometry method at University of Edinburgh, where also determination of surface area (BET), x-ray powder diffraction analysis (XRD) analysis will be conducted. The concentrations of amino acids and amino sugars in the sediment will be investigated as described by Cowie and Hedges (1992) also at University of Edinburgh.

Samples from sediment slices will be further analysed at the University of Southern Denmark for phytopigments following modified method after Shuman (1975), environmental DNA, viruses and prokariota using methods described by Glud at all (2013).

7.9.3. Work at sea

Samples were taken with aid of the multicorer. In total, 392 samples for sediment analysis were obtained during the SO250 (KuramBio II) cruise. During the cruise following steps of sediment sampling and processing were performed. The eleven cores were cut through 1 cm slices and stored immediately after coring. Cores were split horizontally and divided into work and archive halves. One half was used for sediment description, measurements and sampling, the other half was stored for archive. Visual core descriptions were carried out on the archive halves of core segments. The lithology was described prior to sampling. Each corer was cut into work and subsequently photographed, visual descripted, sampled the smear slides. Smear slides were prepared for each lithological unit. A total of 67 smear slides were taken from the cores in order to verify the onboard visual core descriptions. Samples from the core were taken every 5 cm for measuring the sediment humidity (water content) and density according to the weight method. The method includes sampling of 10 cm^3 of non-disturbed sediment, subsequent drying at 105°C temperature, and weighing before and after drying.

Sediment samples were collected from 11 areas, from depth ranging from 5146.6 m 9540.2 m t, from both slopes and trench axis. Altogether 32 cores were collected, (27 from MUC and 4 cores from Box corer), all cores were sliced and sub-sampled for laboratory analysis. Two neighbouring cores from MUC 1 from each area were sliced in 1 cm horizons down to 10 or 20 cm and then in 2 cm horizons accordingly so the proposed analyses accolade. Samples for determining ^{210}Pb, total and organic carbon (TC, OC), nitrogen (N), calcium (Ca), porosity and water content were taken from one of these cores and preserved in -20°C. Each slice from the second core was sub-sampled in following way. Approximately 8ml of sediment from each depth slice was taken for sediment grain size, determination of surface area (BET) and x-ray powder diffraction analysis (XRD); and stored in -20°C. Core slices were further sub-sampled for phytopigments determination (3 x 2 ml), prokaryotic and viral abundance (3 x 1 ml fixed with glutaraldehyde), amino acids and amino sugars (1 ml) and DNA (44 ml) and all preserved in -80°C.

Additional cores from the area were sliced in identical way and will be used for determining ^{210}Pb, OC, N, density, porosity and water content with intention to determine patchiness at the seafloor.

Table 14: Summary of samples collected during KuramBioII and proposed laboratory analyses (number of samples does not include replicates).

Type of analysis	Nr of cores	Nr of slices
^{210}Pb	19	330
TC, OC, N	19	330
Water content, porosity, dbd	19	330
^{234}Th	6	38
Grain size, BET, XRD	12	190
Amino acids, amino sugars	11	182
Phytopigments	11	181
DNA	11	181
Prokariotic abundance	11	181

7.9.4. Preliminary results

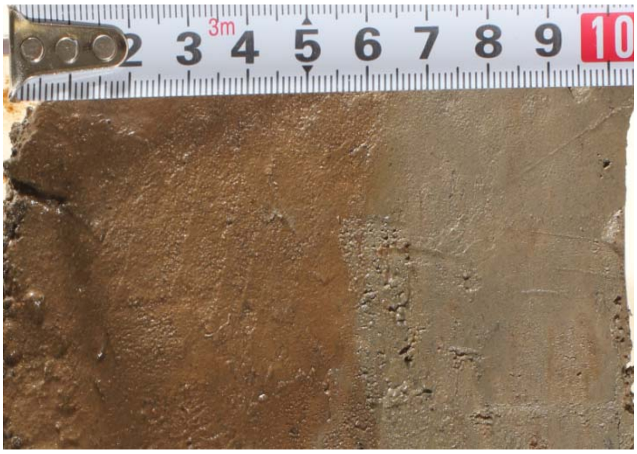

Fig. 23: Core SO250-4 (area A8) (©A. Mayorova). Description: 0-5.5 cm - Silty clay, brown, oxidized, soft consistence. On surface (0-1 cm) single rounded and sharp-edged pebbles (size about 1 cm).

At 4-5.5 cm: silty clay, soft, stiff. 5.5-10 cm - Clayey-silt, greyish olive with brown spots and streaks, dense, viscous, without fragments. A border between layers is sharp and uneven.

Table 15: KuramBioII areas and stations where cores were collected.

Area	Station	Core	Gear	Date	Time	Latitude	Longitude	Depth (m)
A1	15	5	MUC 1	21/08/2016	16:48:57	45°50,875'N	153°47,975'E	8254.7
	15	6	MUC 1	21/08/2016	16:48:57	45°50,875'N	153°47,975'E	8254.7
	16	6	MUC 2	21/08/2016	23:15:19	45°50,877'N	153°47,996'E	8255.2
A2	95	5	MUC 1	18/09/2016	08:32:38	44° 6,850'N	151° 25,560'E	6517.5
	95	6	MUC 1	18/09/2016	08:32:38	44° 6,850'N	151° 25,560'E	6517.5
A3	62	2	MUC 1	08/09/2016	20:14:19	45°10,002'N	153°45,425'E	5741.2
	62	3	MUC 1	08/09/2016	20:14:19	45°10,002'N	153°45,425'E	5741.2
	63	4	MUC 2	09/09/2016	00:00:40	45°10,007'N	153°45,420'E	5739.4
A4	48		Box Corer	04/09/2016	15:23:31	45°28,745'N	153°11,651'E	8736.4
	51	4	MUC 1	05/09/2016	11:38:05	45°28,751'N	153°11,644'E	8734.9
	51	5	MUC 1	05/09/2016	11:38:05	45°28,751'N	153°11,644'E	8734.9
	53	1	MUC 2	06/09/2016	03:35:47	45°28,751'N	153°11,648'E	8941.4
A5	38	10	MUC 1	28/08/2016	21:00:39	45°38,610'N	152°55,914'E	7136.7
	38	11	MUC 1	28/08/2016	21:00:39	45°38,610'N	152°55,914'E	7136.7
	39	9	MUC 2	29/08/2016	02:43:45	45°38,609'N	152°55,923'E	7134.6
A6	24		Box Corer	25/08/2016	02:04:04	45°55,230'N	152°47,468'E	6065.4
	26	5	MUC 1	25/08/2016	13:40:19	45°55,226'N	152°47,468'E	6065
	26	6	MUC 1	25/08/2016	13:40:19	45°55,226'N	152°47,468'E	6065
	27	4	MUC 2	25/08/2016	18:37:36	45°55,236'N	152°47,466'E	6065.4
A7	79		Box Corer	14/09/2016	04:41:03	45°12,943'N	152°42,821'E	9448.9
	79		Box Corer	14/09/2016	04:41:03	45°12,943'N	152°42,821'E	9448.9
A8	4	3	MUC 1	18/08/2016	05:14:01	43°49,201'N	151°45,589'E	5146.6
	4	6	MUC 1	18/08/2016	05:14:01	43°49,201'N	151°45,589'E	5146.6
	5	1	MUC 2	18/08/2016	09:08:34	43°49,192'N	151°45,599'E	5146.7
A9	74	5	MUC 1	12/09/2016	03:10:47	44°39,883'N	151°28,106'E	8221.1
	74	6	MUC 1	12/09/2016	03:10:47	44°39,883'N	151°28,106'E	8221.1
	88	5	MUC 1	16/09/2016	14:10:33	44°39,862'N	151°28,103'E	8224
A10	83	8	MUC 1	15/09/2016	01:23:12	45°1,356'N	151°2,901'E	5211.3
	83	9	MUC 1	15/09/2016	01:23:12	45°1,356'N	151°2,901'E	5211.3
A11	101	4	MUC 1	20/09/2016	10:56:36	44° 12,391 N	150° 36,015'E	9538.6
	101	5	MUC 1	20/09/2016	10:56:36	44° 12,391 N	150° 36,015'E	9538.6
	105	6	MUC 2	21/09/2016	21:25:40	44° 12,388'N	150° 36,013'E	9540.2

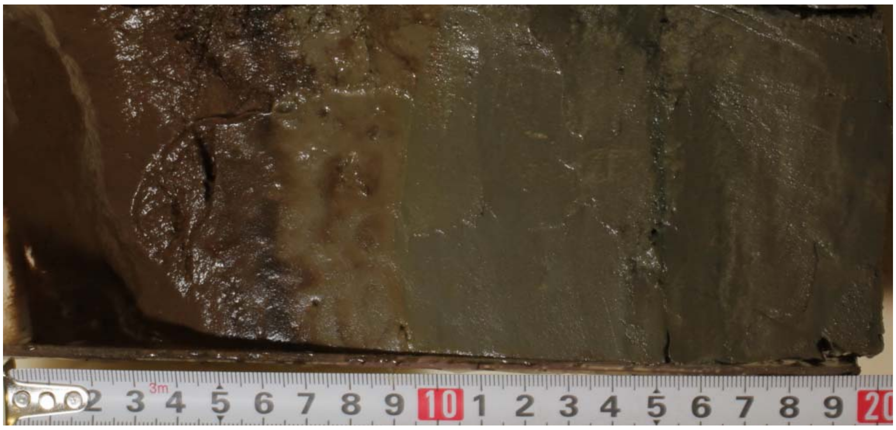

Fig. 24: Core SO250-15 (area A1) (©A. Mayorova). Description: 0-5.5 cm - Clayer-silt, brown, oxidized, liquid (0-1 cm), semiliquid (1-2 cm), soft (2-5.5 cm) consistence, homogeneous. 5.5-7 cm - Interlayer of clayer-silt, black, soft, not viscous. 7-9 cm - Clay, lightly brown with dark brown spots, soft. A border between a layers is waterworn. 9-20 cm - Clay, olive, dense, viscous, without fragments. At 15 cm microlayering (1-3 mm) of bright dark green sediment, very dense. 15-20 cm - Clay, olive with lightly green spots and streaks, dense, homogenous.

Fig. 25: Core SO250-26 (area A6) (©A. Mayorova). Description: 0-1 cm - Clayer-silt, brown, oxidized, liquid. 1-2 cm - Mixture silty-clay brown and olive, semiliquid, without fragments. 2-3 cm - Silty-clay, olive, semiliquid. 3-21 cm - Silty-clay, olive, soft. 21-22 cm - Interlayer of grayish-olive, silty-clay, soft. 22-24.5 cm - Clay, lightly brown, soft with silt grains. 24.5-26 cm - Interlayer of silt, brown, soft. 26-27 cm - Clayer-silt, lightly brown, soft. 27-31.5 cm - Interlayer grayish-olive clayer-silt with black volcano sand grains, very dense, stiff, viscous. Sharp border between the layers. 31.5-34.5 cm - Silty-clay, olive, dense, viscous. 34.5-37.5 cm - alternating intervals of olive and grayish olive with silt grains, very dense. 37.5-41.5 cm - Clay, olive, very dense. 41.5-43 cm - Silty-clay, lightly olive, very dense with black volcano sand.

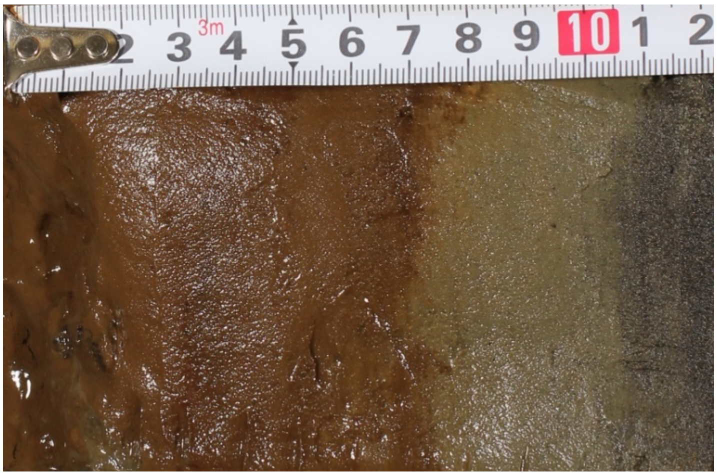

Fig. 26: Core SO250-39 (area A5) (© A. Mayorova). Description: 0-1 cm - Silty-clay with minor black sand, brown oxidized, liquid, smell of *Travisia*. 1-7 cm - Silty-clay, brown, soft. 7-10 cm - Silty-clay, olive, soft, mottled due to black spots (lenses). 10-12 cm - Sand, black, stift, plastic. A border between the layers is sharp.

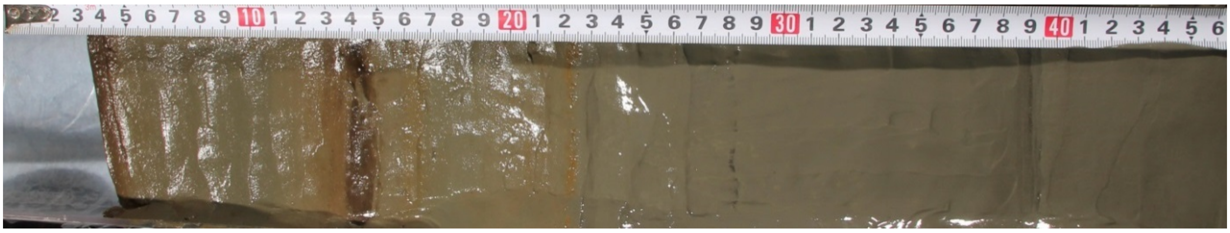

Fig. 27: Core SO250-51 (area A4) (© A. Mayorova). Description: 0-1 cm - Clay, brown oxidized, liquid. 1-3.5 cm - Clay, brown, soft, homogenous, without smell. 3.5-12 cm - Clay, alternating intervals of grayish-olive and lightly brown, soft, without fragments. 12-14 cm - Clay, lightly brown, soft. 14-14.5 cm - Clay, interlayer dark brown, soft. A border between the layers is sharp. 14.5-22 cm - Clay, grayish-olive, interlayer yellow brown in interval 16 cm, soft. 22-22.5 cm - Interlayer clay, yellow brown, dense, viscous. 22.5-38.5 cm - Clay, grayish-olive, soft, interlayer black in interval 28 cm. 38.5-39 cm - Interlayer clay, black, soft, plastic, viscous. 39-46 cm - Clay, grayish-olive, dense, plastic.

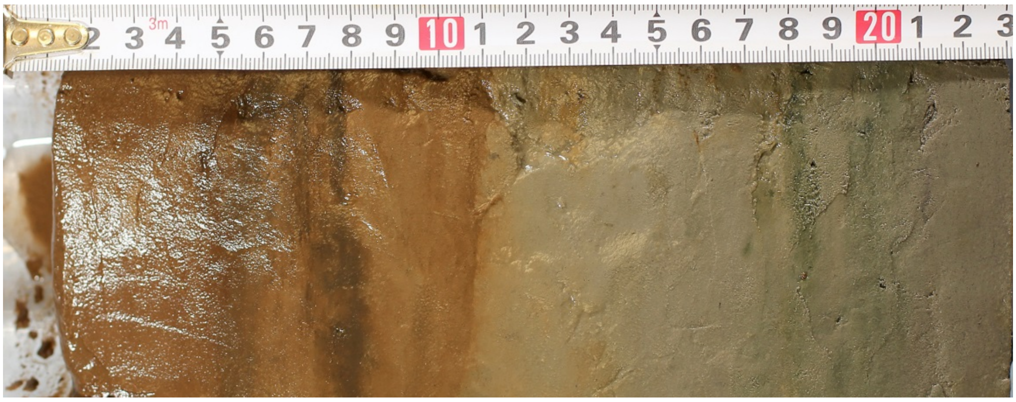

Fig. 28: Core SO250-62 (area A3) (© A. Mayorova). Description: 0-1 cm - Clayey-silt, brown oxidized, liquid. 1-4,5 cm - Clayey-silt, brown oxidized, soft. 4,5-6 cm - Clay, dark brown, soft. 6-7 см - Clay, lightly brown with dark brown interlayers, soft, homogenous. A border between the layers is waterworn.7-8 cm - Clay, dark brown, soft, viscous. 8-11 cm - Clay, lightly brown to dark brown. 11-23 cm - Clay, yellow brown to olive, soft. In intervals 18-18,5 cm and 20 cm - clay, dark green interlayers horizontally oriented, very dense, plastic.

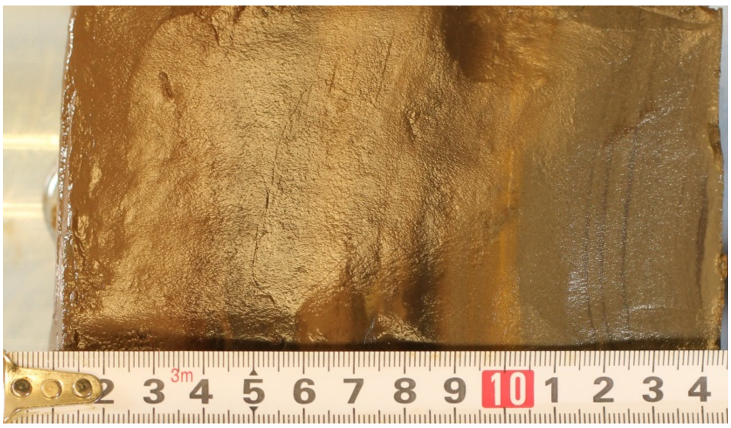

Fig. 29: Core SO250-74 (area A9) (© A. Mayorova). Description: The sediment laminated texture. 0-1 см - Clay, brown, semiliquid. 1-4 см - Clay, brown, soft, homogenous. 4-6,5 см - Clay, black, soft, plastic, viscous. A border between the layers is waterworn. 6,5-8 см - Clay, brown, dense, plastic, viscous. 8-9 см - Interlayer clay, black, soft, viscous, homogenous. 9-10 см - Clay, brown to yellow brown, viscous, plastic. 10-14,5 см - Clay, olive with horizontally oriented black streaks rare (about 1 mm), dense, plastic, viscous.

Fig. 30: Core SO250-79 (area A7) (© A. Mayorova). Description: 0-1 cm - Clay, brown oxidized, semiliquid. 1-3 cm - Clay, brown, soft, homogenous. 3-7.5 cm - Clay, grayish-brown, dense, stift, viscous, at 4-5 cm - black lenses of silt with sharp border. 7.5-16 cm - Clay, grayish-olive, very dense, stiff, at 10 cm and 15.5 cm horizontally oriented rare black streaks of silt. 16-19 cm - Clay, lightly olive, very dense. A border between the layers is waterworn. At 19 cm - streak of dark green clay, very dense, stift. 19-32 cm - Clay, olive, very dense, with horizontally oriented rare black streaks of silt.

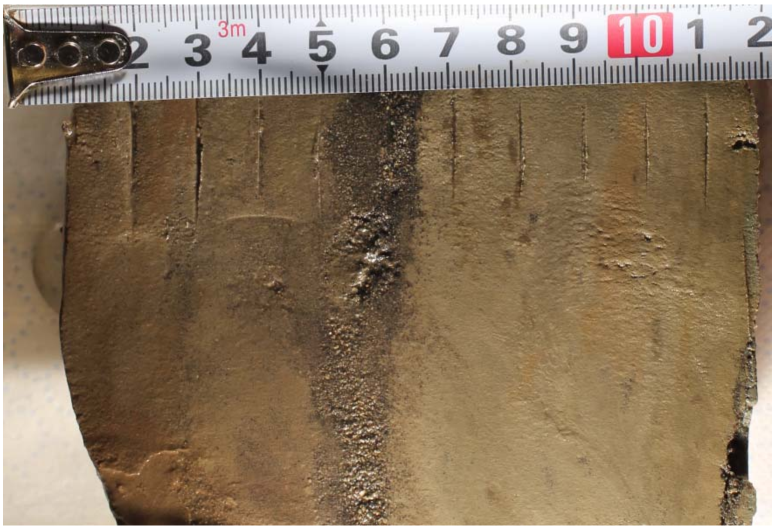

Fig 31: Core SO250-83 (area A10) (© A. Mayorova). Description: 0-1 cm - Silt, brown, liquid. 1-3 cm - Silt, brown, soft. 3-5 cm - Silt, grayish-olive, soft with minor black sand. 5-6.5 cm - Interlayer of black sand. A border between the layers is sharp and oblique. 6.5-12 cm - grayish-olive, at 8 cm mottled due to brown lenses of silt. At 10 cm and 12 cm - Clay, yellow brown, dense, with silt, stiff.

Fig. 32: Core SO250-95 (area A2) (© A. Mayorova). Description: 0-1 cm - Silty-clay, brown, liquid, homogeneous. 1-5 cm - Silty-clay, brown, soft, sulfurous smell. 5-15.5 cm - Clay, olive, very dense. At 7-8 cm black rolled pebble (1.5×2 cm). At 14-15 cm - Interlayer volcanic black sand.

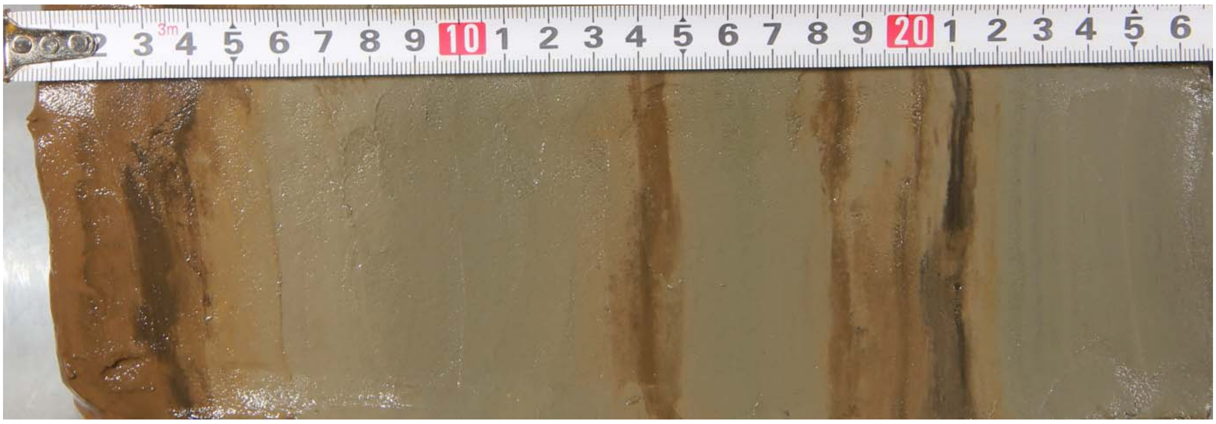

Fig. 33: Core SO250-101 (area A11) (© A. Mayorova). Description: 0-1 cm - Clayer-silt, brown oxidized, liquid. 1-5.5 cm - Clay, brown, soft, at 3-4 cm mixture of brown and black. A border between the layers is waterworn. 5.5-14 cm - Silty-clay, olive, soft, homogeneous. At 14-15 cm - Interlayer of clay, brown, soft. 15-22 cm - Clay, grayish-olive, soft. At 18-20 cm - Interlayer of clay, brown, soft. At 21 cm - Interlayer of black clay, soft. At 21-22 cm - Interlayer of lightly brown clay, soft. 22-26 cm - Clay, olive, dense, homogeneous, stiff.

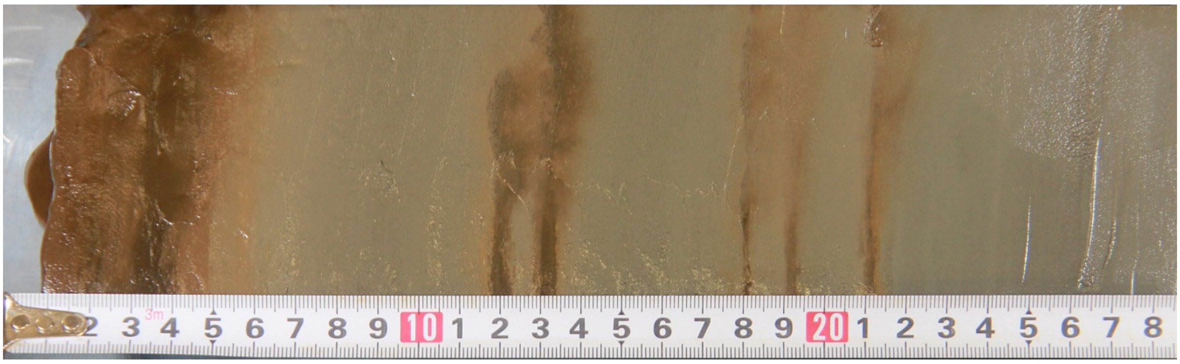

Fig. 34: Core SO250-104 (area A11) (© A. Mayorova). Description: 0-1 cm - Clay, brown oxidized, liquid, homogeneous. 1-3 cm - Clay, brown, soft. A border between the layers is waterworn. 3-4 cm - Interlayer of clay, dark brown, soft, homogeneous. 4-6 cm - Mixture of brown and lightly brown clay, soft. 6-11 cm - Clay, grayish-olive, soft. At 12-13 cm - Interlayer of clay, dark brown and yellow brown, soft. A border between the layers is waterworn. 13-21 cm - Clay, grayish-olive, soft, homogeneous. At 17-18 cm - Interlayer of dark brown clay, soft. At 21 cm - Interlayer of dark brown silt with lightly brown border, dense. 21-28 cm - Clay, olive, dense, homogeneous, stiff. At 26 cm - Interlayer of black silt.

7.10. Meiofauna

7.11. Molecular diversity and distribution of Foraminifera: phylogenetic and environmental DNA sequencing studies.

F. Lejzerowicz, T. Cordier, J. Pawlowski [not on board]

Foraminifera is an ancient phylum of single-celled eukaryotes belonging to Rhizaria (Protista) that is found diverse and abundant in deep-sea benthic communities. Foraminifera have mainly been studies from a micropaleontological perspective based on calcareous tests preserved in the sediment. Yet, most of the foraminiferal diversity have agglutinated or organic tests (Gooday

2002), and thus do not fossilize, which is also the case for the enigmatic groups Komokiacea (Tendal and Hessler 1977) and Xenophyophorea (Tendal 1989). In particular, monothalamiids (i.e. single-chambered Foraminifera) have been found highly diverse in various environments, including in the deep-sea benthos (e.g. Gooday et al. 2001) where they may dominate foraminiferal communities, as evidenced from analyses of morphological assemblages (e.g. Gooday et al. 2004) and of environmental DNA molecules sequenced at very high throughput (Lecroq et al., 2011). However, the extent diversity of monothalamiids is essentially unknown. Indeed, the absence of conspicuous morphological characters complicates systematic studies, which could be augmented with molecular data to better describe species and to establish a robust phylogenetic framework.

Small organic-walled monothalamiids have been found thriving at hadal depths (Gooday et al. 2008) and still occur at the Ocean's greatest depth (Todo et al. 2005). At the bottom of trenches, even the macrofauna may be dominated by a group related to Foraminifera: Xenophyphorea (Gallo et al. 2015). Xenophyophoreans may already occur at density reaching 21 individuals/m^2 at abyssal depths (e.g. Nazaré Canyon; Gooday et al. 2011). The evolutionary origins and ecological roles of Xenophyphorea and of another enigmatic group of delicate Foraminifera (Komokiacea) are still unclear. They have been proposed as structures providing habitat for diverse eukaryotic communities as a result of morphological (Levin 1991) and molecular (Lecroq et al. 2009a) surveys. Unfortunately, there is a general lack of genetic information about these organisms because of their large size, complex test composition and structural heterogeneity, which all impair the recovery of fresh cellular material. No sequence was unambiguously ascribed to a komoki and even the membership of some xenophyophoreans to Foraminifera remains to be genetically confirmed (Lecroq et al. 2009b). To my knowledge, never a foraminiferal DNA molecule originating from the raw environmental DNA material that may have sedimented over a trench slope and settled down to the bottom have been sequenced.

7.11.1. Objectives

Several objectives will be kept in mind given the sampling scheme of KuramBio II, and given our previous participation to the KuramBio I and SokhoBio expeditions:

- One recurrent objective concerning this and previous expeditions is to obtain well-preserved foraminiferal specimen material to achive specific DNA extraction and generate molecular data i) suitable for phylogenetic descriptions and ii) to improve the reference database with additional barcodes for the taxonomic assignment of environmental DNA sequences. The Foram Barcoding project (Pawlowski and Holzmann, 2014) managed at the Pawlowski lab is aiming at providing curated reference genetic resources in the form of a public database (http://forambarcoding.unige.ch). This database is curated and updated with new entries of described specimens, associated with a ribosomal RNA gene sequence marker and its revised phylogenetic framework. The common-thread objective is to create a database entry for every Foraminifera species collected during the expedition and from which high-quality DNA barcode sequences could possibly be generated. This objective is especially challenging for large agglutinated species belonging to Xenophyophorea and Komokiacea, for which single-specimen high-throughput DNA (and RNA) sequencing approaches are being developed in the Pawlowski lab.

- Another objective is to improve our understanding of the ecological and biogeographic patterns of Foraminfera in the deep sea. This requires accurate taxonomic assignments, which could be achieved using molecular approaches. Diversity studies based on the high-throughput sequencing of sediment DNA (metabarcoding) proved efficient to identify and account for the cryptic diversity of inconspicuous species such as the monothalamiids. It allows to document several issues related to environmental perturbation and could deliver exhaustive data on the beta-diversity of environmental communities, as well as on their composition and structure in relation to the various environmental parameters measured by the ship's party collaborators. Metabarcoding complements traditional approaches relying on morphological examinations as it is based on bulk sediment material and hence captures the whole diversity of Foraminifera from all size classes. Metabarcoding yields results quickly and – importantly – for hundreds of samples simultaneously, which will readily informs further more detailed morphological and/or genomic investigations.
- One last objective relates to the fact that environmental sequencing studies rely on the total DNA content of surface sediments. Hence, metabarcoding data is affected by the presence of tremendous amounts of extracellular DNA molecules (Dell'Anno and Danovaro, 2005). These molecules are ecologically irrelevant and distort diversity estimates. Targeting RNA molecules proved useful to target living formainifera in deep-sea sediment (Lejzerowicz et al. 2013), and thus may help address several questions: what is the extent of the foraminiferal diversity that is potentially active and that may represent cosmopolitan species in the deep Kurile-Kamchatka Trench area? Are active monothalamiids also very diverse or is the DNA signal irrelevant in highly depositional environment such a trench?

Moreover, along with the material collected during SO237 expedition in the Puerto Rico Trench, the samples taken along the Kurile-Kamchatka Trench depth transect allows the testing of hypotheses related to particles sinking and trapping in depression, as well as to the enrichment of specific taxa, such as Xenophyophoreans and organic-walled monothalamids (e.g. *Nodellum*, *Resigella*) (Gooday et al. 2008).

7.11.2. Work at sea

We subsampled surface sediment from a maximum of two cores for each multiple corer (MUC) deployment. With these two cores per deployment, we used each core both for environmental genomics and for live picking and DNA barcoding of individuals.

For environmental sequencing, i.e DNA and cDNA metabarcoding, around 2 grams of surface sediment material (from the first centimeter layer) was mixed in 14 ml Falcon tubes containing 6 ml of RNA Lifeguard Preservation Solution (MoBio). The core sediment sub-sampling was performed wearing gloves with disposable RNAse-free spatula. The samples were immediately placed at -20°C on board and kept frozen for shipping. Environmental DNA and RNA extractions, PCR amplification of diverse taxonomic gene markers, and massive sequencing on an Illumina MiSeq instrument will be performed at the University of Geneva (Switzerland).

We dedicated one core taken at one of the deepest station (9500 meters) for subsurface sediment sampling. The 5 first centimeters were sliced and 3 replicates sub-sampled and immersed in Lifeguard Solution as above.

For database completion, species-based genetics and phylogenetics, we sieved the rest of the sediment from each core through 500, 250, 125 and 63 μm meshes and each fraction was inspected under a binocular microscope for living Foraminifera. Hard shell, calcareous, or solid agglutinated individuals were isolated, identified and dried on micropaleontogical slides. Softly agglutinated and organic-walled specimens were isolated, identified and immersed in RNAlater (Ambion) for morphological and molecular preservation. Large Xenophyophorea specimens were also occasionally recovered from the box corer (GKG), and immersed in RNA Lifeguard Preservation Solution. All isolated specimens will be shipped frozen at -20°C prior to extraction and Sanger sequencing in the laboratory. Unfortunately, no picture could was taken for every specimen as it was the case during KuramBio I. Accurate species identifications will be perfomed in the laboratory in order to correct informal names as well as erroneous formal assignments made on board.

Finally, the first five centimeters of sediment of one core taken at one deep station where occurred dark-coloured calcareous foramiferans (*Oridorsalis sp*.) was fixed in ethanol 70 % observed stained with c.a. 1 g l^{-1} of Bengal Rose in order to report the proportion of living calcareous foraminifera at a depth affected by intense calcium carbonate dissolution.

7.11.3. Preliminary results

A total of 35 cores out of 24 multiple corer (MUC) deployments were recovered, from 11 sampling area. At one of the deepest stations, a box corer was used instead, because of unsuccessful sediment sampling by the MUC. The sampling depth ranged from approximately 5100 meters to 9500 meters. From each core could be obtained the 3 sediment replicates, which amounts to a total of 105 samples for environmental DNA (and RNA) sequencing using metabarcoding.

A total of 1481 specimens have been picked, representing 138 formal and informal morphospecies representing all main Foraminifera orders (Figure 1). Most of the Foraminifera taxa collected during KuramBio II were already found in the samples collected during KuramBio I (Figure 2, Lejzerowicz et al., 2014). Interesting large specimens belonging to the phylum Xenophyophorea and Komokiacea were collected either from the MUC (Figures 3 and 4) or from the box corer (Figure 5). These individuals were immersed in RNAlater (Ambion).

All sequencing data generation and analysis will be supervised by Prof. Jan Pawlowski at the University of Geneva (Switzerland). In particular, molecular phylogenetic studies based on single isolated Foraminfera specimens will be coordinated by Maria Holzmann and Emanuela Reo. Environmental DNA studies aiming at understanding the distribution and biogeography of Foraminifera and related protists (as well as Metazoa) at abyssal and hadal depths will be performed by Tristan Cordier and Franck Lejzerowicz.

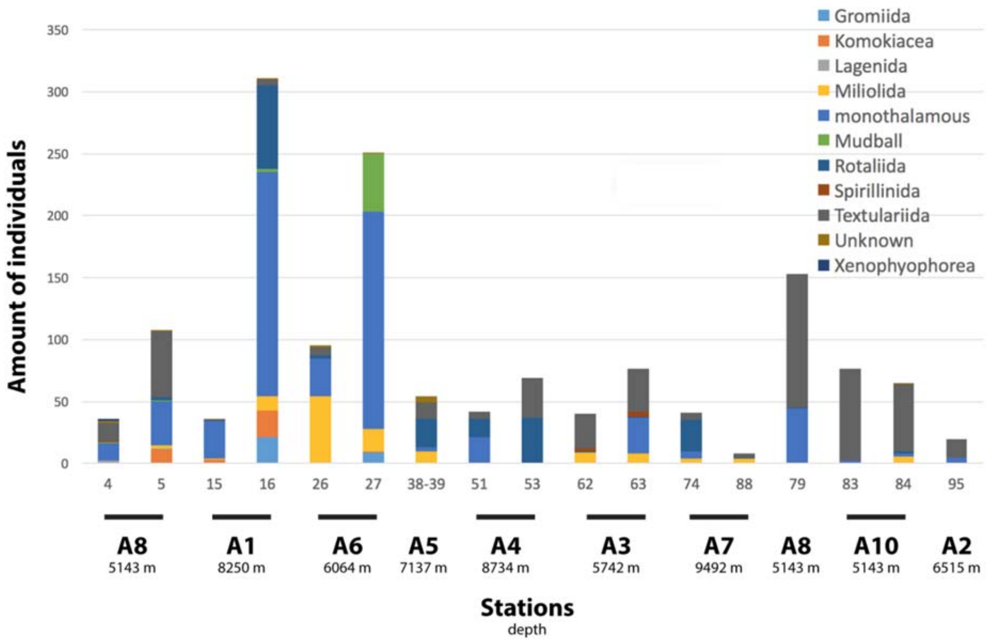

Fig.35: Amount of Foraminifera individuals collected per multiple corer deployment and per taxon (order level or informal name). Two cores were usually sorted for individuals, although for some stations, only one core was available. At station A5, the sediment of two MUCs was merged. The last station A11 was not treated at the time of writing. Note that for the station A7, the sediment is sub-sampled from a box corer.

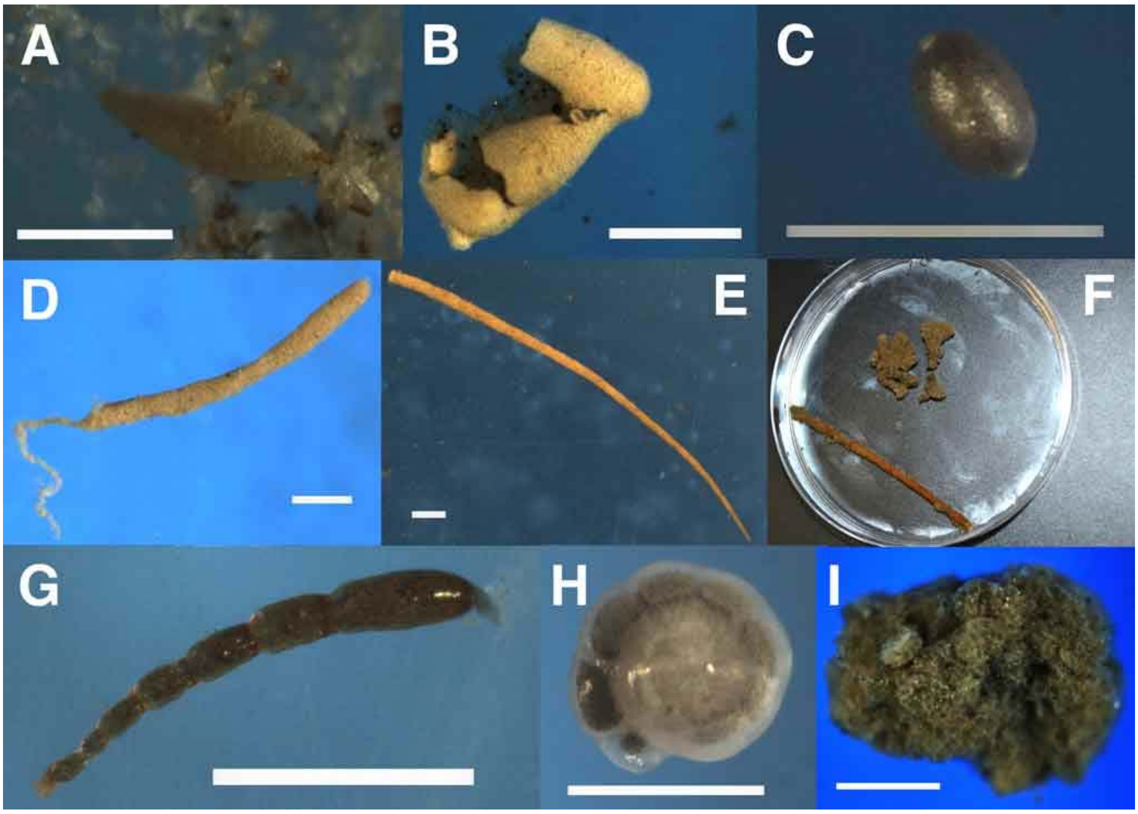

Fig. 36: Foraminifera collected during KuramBio and also found alive during KuramBio II. Monothalamiids (single-chambered) with tests made of the agglutination of fine (A-D) or bigger (E, F) sediment grains or with organic tests (G, Nodellum sp.) were found, as well as numerous specimens with multi-chambered calcareous tests (H, Oridorsalis) and komokiceans (I). Scale bars: 0.6 mm. © Franck Lejzerowicz.

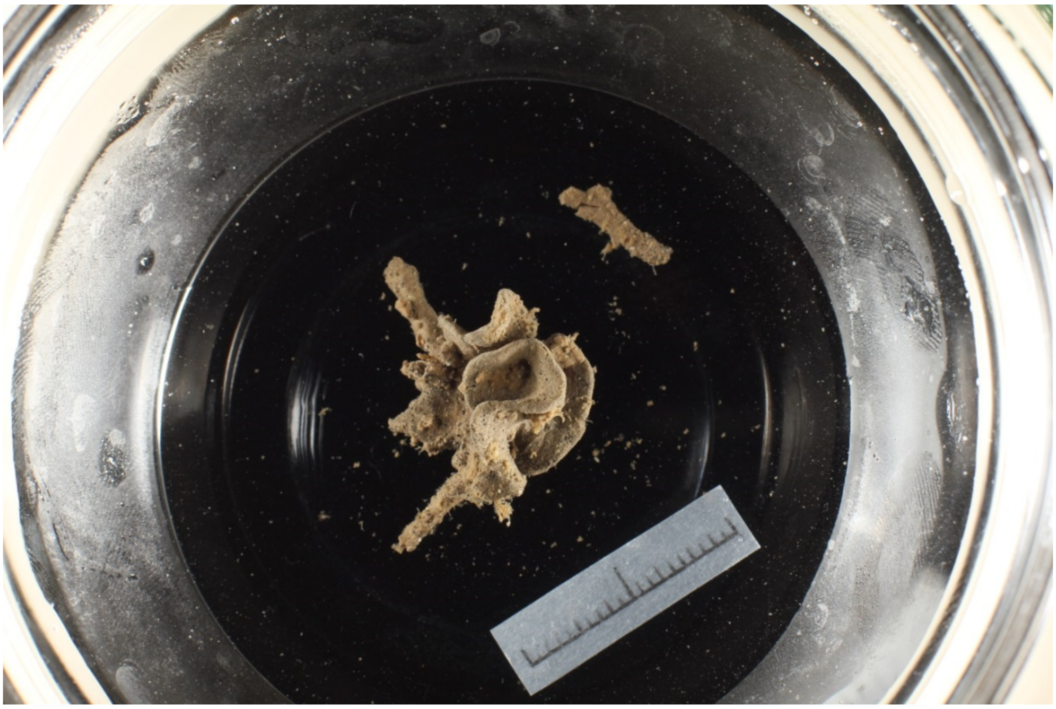

Fig. 37: Large agglutinated specimen possibly related to the genus *Dendrophrya* found on the surface of a core at station 95. Visible are one broken and two intact tubular extensions from a foliated basal pad structure. © Anastassya Maiorova.

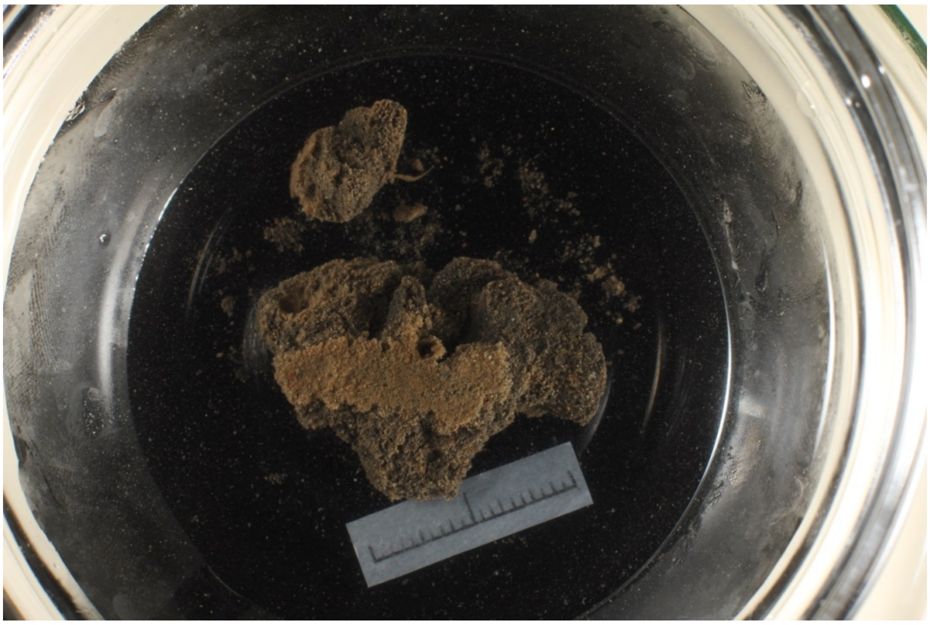

Fig. 38: Giant Xenophyophorea specimen found at the edge of a core tube at station 95. The dark brown area corresponds to the fragile foliated structure whereas the light brown area in the middle is the result of its cutting and squashing by the core edge. © Anastassya Maiorova.

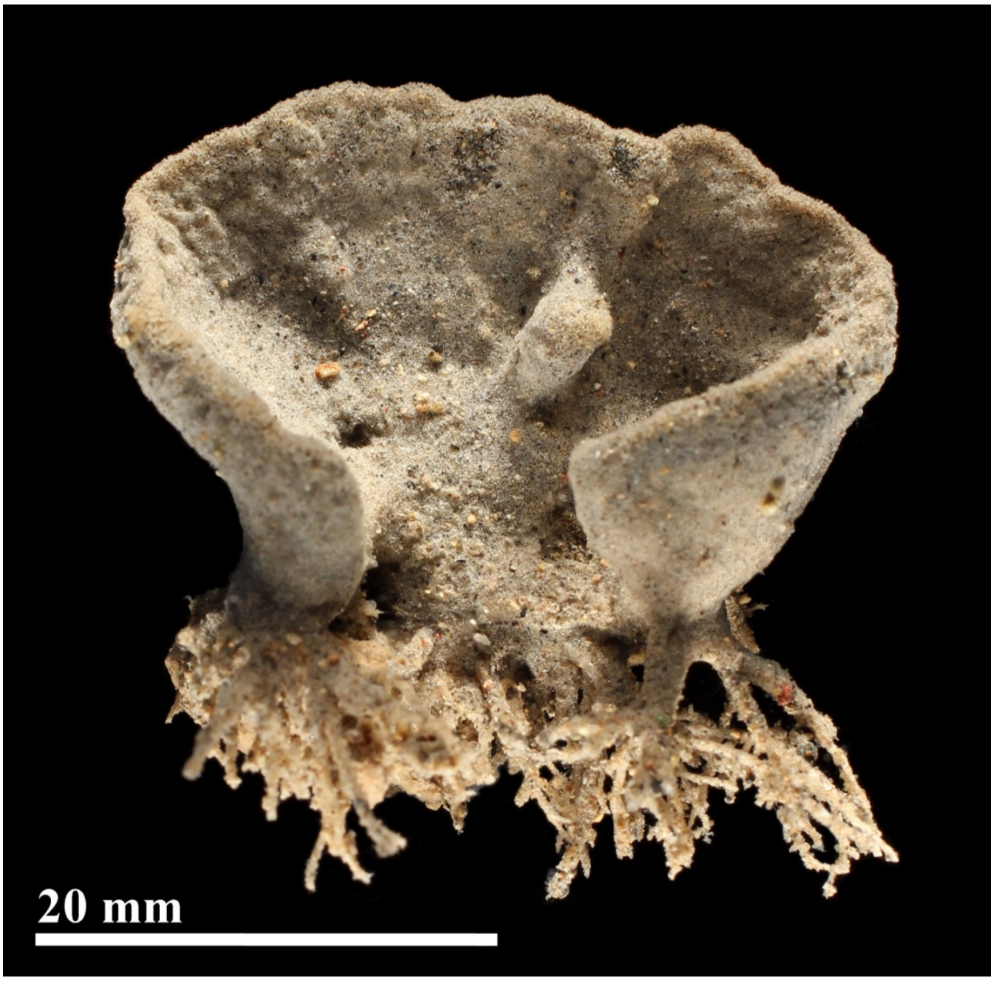

Fig. 39: Giant Xenophyophorea specimen found on the surface of the boxcorer at station 94. The discontinuity between the upper folded foil and the lower rhizoid network denotes the sediment-water interface position. © Anastassya Maiorova.

7.12. Preliminary results on benthic and hyperbenthic Copepoda

N. Mercado Salas, H. Yoo, H. Tanaka, P. Martinez Arbizu.

7.12.1. Objectives

The main aim of the copepod study on board was the extraction of DNA and amplification of the genes COI, 18s, 28s and H3. The aim is to use selected taxa for the reconstruction of the phylogenetic relationships of copepods. For some selected common taxa the gene COI was amplified in order to study the genetic connectivity between populations within the KKT area, but for a long range comparison with material collected in the Clarion Clipperton Fracture Zone during SO239.

7.12.2. Work at sea

Benthic and hyperbenthic Copepoda (Crustacea) were collected with the multicorer, boxcorer, epibenthic sledge and Agassiz trawl. On board one core from the multicorer was used for fresh sorting of ostracodes. The sediment was sieved trough a 63µm nylon mesh. From this core also the copepods were sorted. Subfractions of the boxcorer and AGT were also processed in this way. EBS subsamples were fixed in Ethanol (see EBS report) and copepods were sorted by the EBS team.

7.12.3. Preliminary results

DNA was extracted from almost 200 specimens. COI amplification success was around 65%. For other genes (18s and 28s) the amplification success was higher (around 95%). Table 16 shows the taxa used for molecular studies and the genes amplified.

The copepods collected by the EBS are biased towards bigger specimens > 1 mm. These do not represent well the meiobenthic community, but provides a good overview on the large benthic and hyperbenthic species. This community is dominated by the families Aegisthidae, Argestidae and Parameiropsidae, Pseudotachidiidae. The family Aegisthidae was the most diverse. We were able to collect several species (numbers in brackets) of the genera Pontostratiotes (2), Stratiopontotes (3), Brotskayaia(3), Pseudocervinia(2), Nudivorax(2), Jamstecia(1), Cerviniella (7) and a new genus that we already know from the abyssal Atlantic and East Pacific Ocean. Most of the species are new to science, but only some could be assigned preliminarily known species. *Pontostratiotes* cf *abyssalis* and *P.* cf *glabrum*, *Einslepinella mediana*, *Parameiropsis magnus*, *Pseudotachidius bipartitus pacificus*, *Dahmsopottekina* cf. *micracanta*, *Brotskayaia tenuiseta*, *Benthomisophria* cf *palliate,* and the bathypelagic planktonic *Mormonilla minor*. The affinities of this fauna are to be found in the abyssal western Pacific fauna and the Arctic Ocean.

Some highlights include the discovery of two species of the cyclopoid family Erebonasteridae at station SO250-86 AGT and SO250-82 (*Ambilimbus* cf. *tuerkayi* and *Centobnaster* n.sp).Members of this family are commonly found in association with macrofauna living in cold seeps and hot vents (Figs 40, 41).

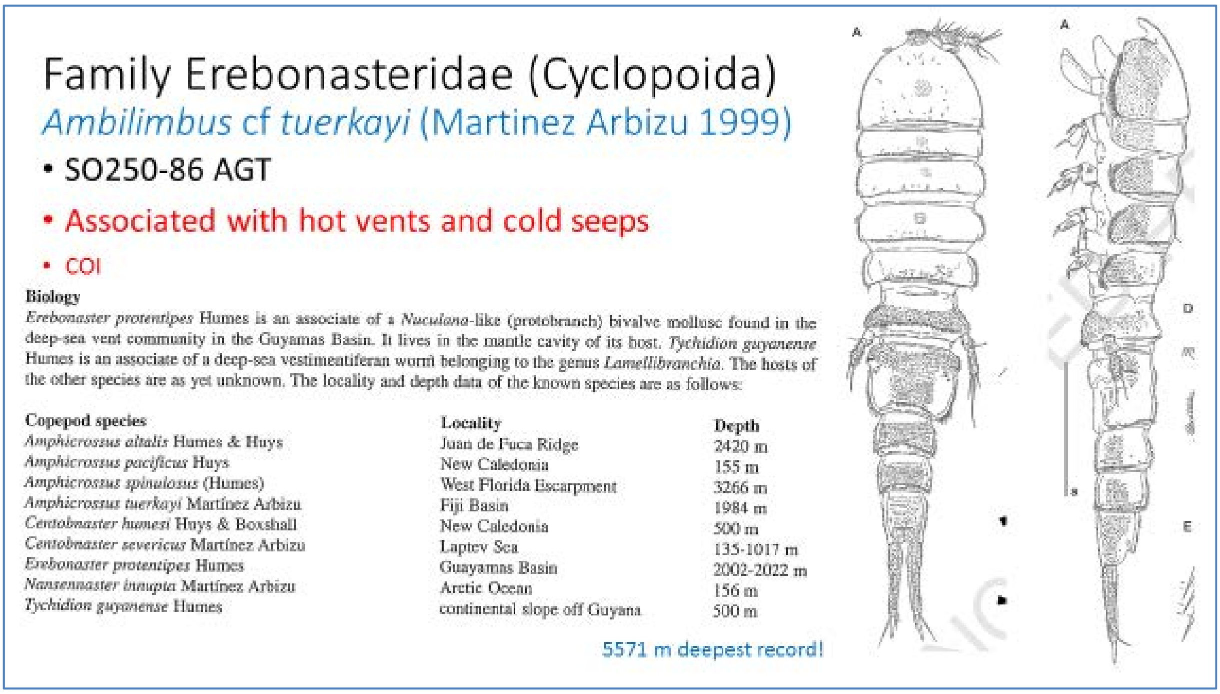

Fig. 40: The Family Erebonasteridae and the species *Ambilimbus tuerkayi.* Text and drawings from Boxshall & Halsey 2004.

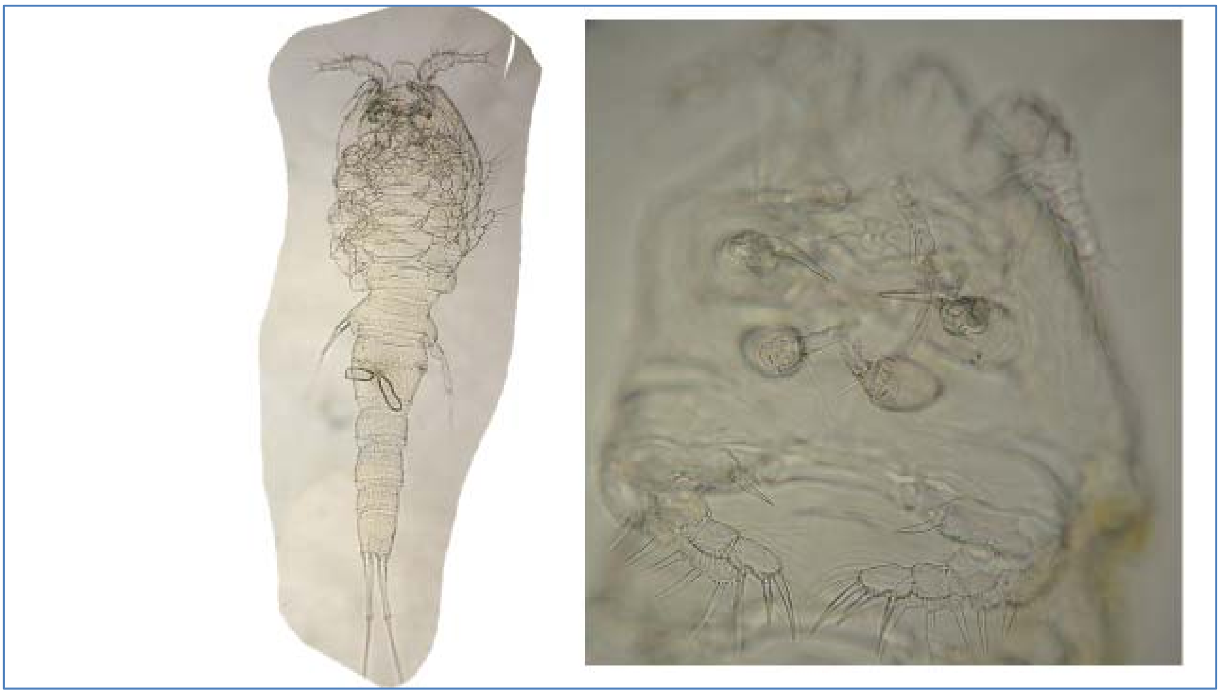

Fig. 41: The species of *Ambilimbus* found at station SO250-86 AGT (left habitus, right detail of mouthparts).

The discovery of a new species of Archinotodelphyiidae on station SO250-42 (Fig. 42) represents the deepest record for this Cyclopoid family. Archinotodelphyids are associated with Ascidia. Preliminary sorting of the EBS samples revealed no ascidia in the sample at that station.

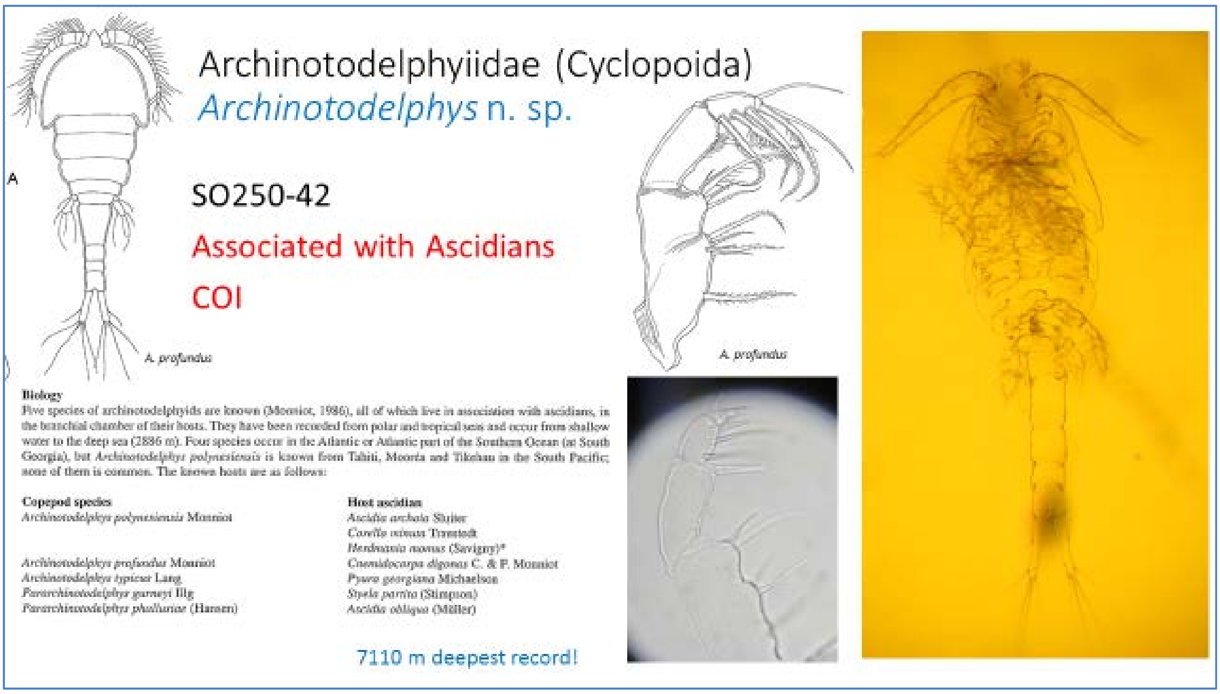

Fig. 42: The new species of Archinotodelphyiidae, left text and drawings from Boxshall & Halsey 2004.

Several new species of *Parameiropsis* were found, including the deepest records in the hadal zone of the KKT. One of the species looks very similar to *P. magnus* Ito 1983

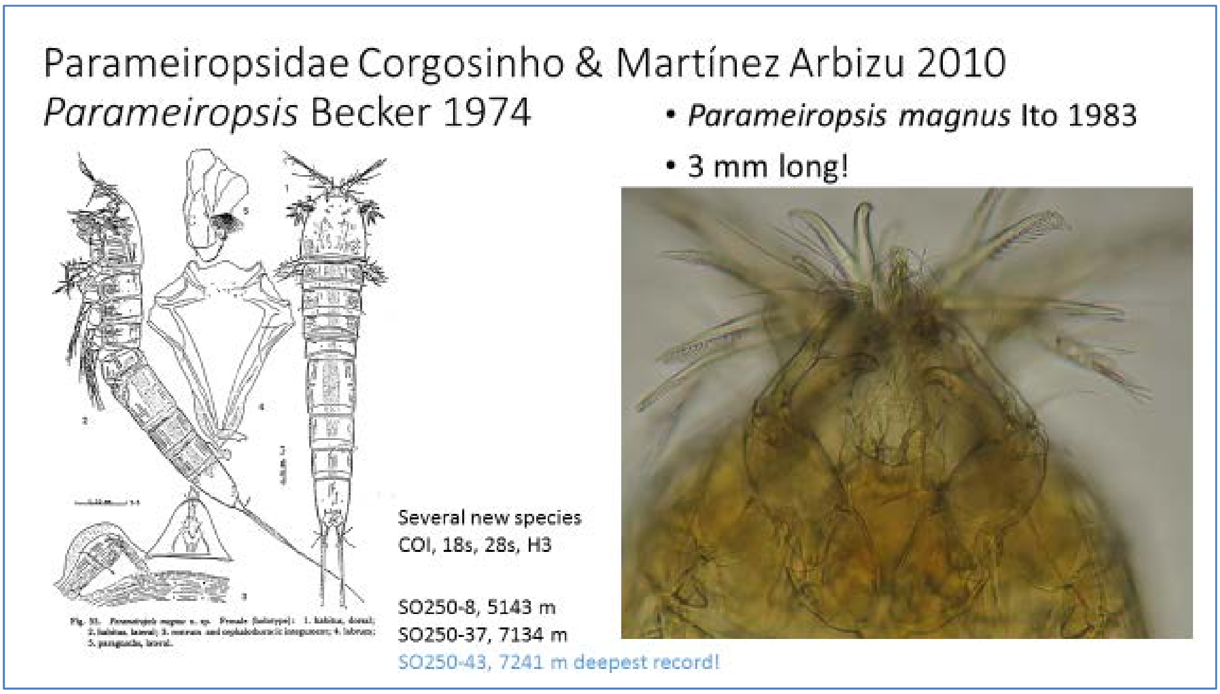

Fig. 43: *Parameiropsis* cf. *magnus* found at station SO250-8, left drawings from Ito 1983.

On station SO250-9 there was a small piece of wood in the sample. OI this wood *Limnoria* was found, but also some ostracods and copepods. The copepods belong to the family Pseudotachidiidae Donsiellininae (Fig. 44).

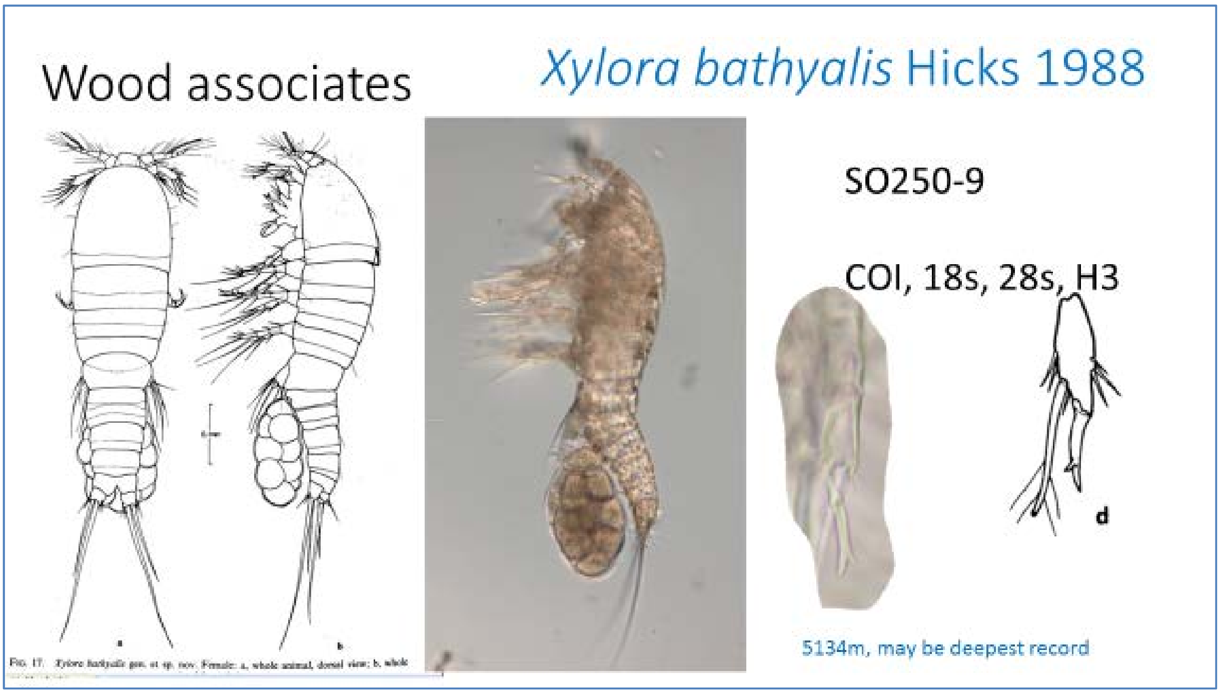

Fig 44: The species *Xylora bathyalis* is commonly associated with wood falls, but also cold seeps and hot vents. Drawings and text Hicks 1988.

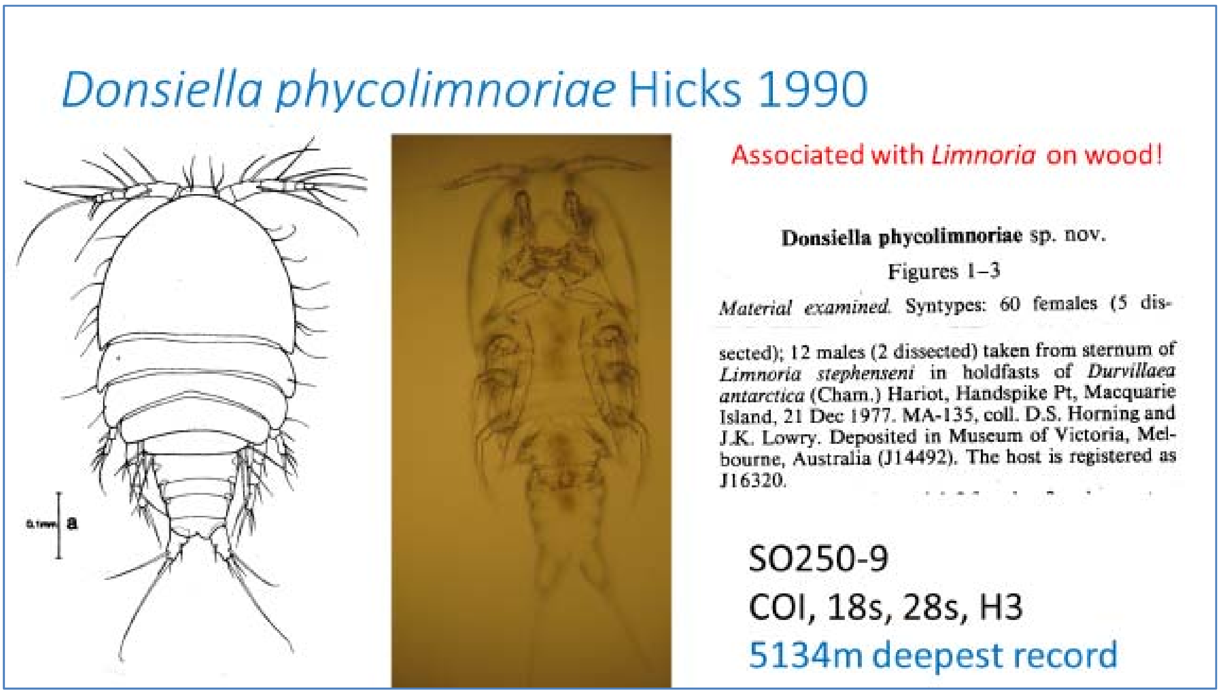

Fig. 45: Donsiella phycolimnoria is associated with Limnoria sp. Living on decaying wood. Drawings and text from Hicks 1990.

Table 16: Organisms from which DNA was extracted and amplified (Copepods, and parasitic taxa). Green shows successful amplification, red unsuccessful.

Nr	Sta	MOTU	Slide	COI	18s	28s	H3
K1	SO250-3	Calanoida sp1		yes			
K2	SO250-3	Calanoida sp1		yes			
K3	SO250-3	Calanoida sp4		yes			
K4	SO250-3	Calanoida sp4		yes			
K5	SO250-3	Calanoida sp3		yes			
K6	SO250-3	Calanoida sp3		yes			
K7	SO250-3	Calanoida sp2		yes			
K8	SO250-3	Calanoida sp2					
K9	SO250-3	Calanoid sp1					
K10	SO250-3	Calanoid sp2					
K11	SO250-3	Calanoid sp3					
K12	SO250-3	Calanoid sp4					
K13	SO250-8	Siphonostomatoid sp 1	Nicothoidae Rhizorhina sp 1Female	yes	yes	yes	yes
K14	SO250-10	Siphonostomatoid sp 1	LOST Nicothoidae Rhizorhina sp 1 female	yes	yes	yes	yes
K15	SO250-8	Isopoda	#				
K16	SO250-10	Isopoda	#				
K17	SO250-31	Ascothoracida Nauplius	Nauplius Ascothoracida	yes	yes	yes	yes
K18	SO250-8	Misophrioida	Benthomisophria cf palliata	yes	yes	yes	yes
K19	SO250-8	Misophrioida	Benthomisophria cf palliata	yes			
K20	SO250-8	Misophrioida	Benthomisophria cf palliata				
K21	SO250-8	Misophrioida	Benthomisophria cf palliata	yes			
K22	SO250-8	Argestidae f	Mesocletodes n.sp. 'inermis'-group, similar to conmixtus	yes	yes	yes	yes
K23	SO250-8	Argestidae f	Mesocletodes n.sp. 'inermis'-group, similar to conmixtus	yes			
K24	SO250-8	Argestidae f	Mesocletodes n.sp. 'inermis'-group, similar to conmixtus	yes			

K25	SO250-8	Parameiropsis	Parameiropsis magnus	yes	yes	yes	yes
K26	SO250-8	Parameiropsis	Parameiropsis magnus	yes			
K27	SO250-8	Argestidae f	Gen. Sp. Somehow resembles Megistocletodes	yes	yes	yes	yes
K28	SO250-8	Cerviniella	Cerviniella n. sp1 cf lagarderei, but furca small differences		yes	yes	yes
K29	SO250-8	Pontostratiotes	Pontostratiotes cf abyssalis	yes			
K30	SO250-8	Pontostratiotes	Pontostratiotes cf abyssalis	yes	yes	yes	yes
K31	SO250-8	Pontostratiotes	Pontostratiotes cf gladium	yes	yes	yes	yes
K32	SO250-8	Cerviniinae	Pontostratiotes copepodid				
K33	SO250-8	Cerviniinae	Stratiopontotes sp. N.	yes	yes	yes	yes
K34	SO250-8	Cerviniinae	Nudivorax n. sp 1	yes	yes	yes	yes
K35	SO250-8	Cerviniinae	Brotskayaia tenuiseta		yes	yes	yes
K36	SO250-8	Cerviniinae	Genus ? Sp.	yes	yes	yes	yes
K37	SO250-13	Mormonilloida	Mormonilla cf. Minor	yes	yes	yes	yes
K38	SO250-13	Mormonilloida	Mormonilla cf. Minor	yes	yes	yes	yes
K39	SO250-13	Mormonilloida	Mormonilla cf. Minor	yes			
K40	SO250-13	Mormonilloida	Mormonilla cf. Minor	yes			
K41	SO250-13	Mormonilloida	Mormonilla cf. Minor	yes			
K42	SO250-8	Cerviniinae	Gen ?				
K43	SO250-25	Cerviniella	Cerviniella n. sp. 2 similar brodskayae	yes	yes	yes	yes
K44	SO250-8	Hase, Aegisthinae	Hase sp.3.	yes	yes	yes	yes
K45	SO250-10	Pontostratiotes	Pontostratiotes cf abyssalis				
K46	SO250-10	Hase, Aegisthinae	Hase copepodid	yes	yes	yes	yes
K47	SO250-10	Misophrioida	copepodid	yes			
K48	SO250-10	Mesocletodes	Mesocletodes B abysallis group spine am kopf not telson				
K49	SO250-10	Mesocletodes	Mesocletodes C, spine am kopf und telson double	yes	yes	yes	yes
K50	SO250-10	Argestidae f	Gen. Sp.	yes			
K51	SO250-10	Cerviniid	Brotskayaia tenuiseta				
K52	SO250-10	Cerviniid	Brotskayaia sp B		yes	yes	yes
K53	SO250-10	Siphonostomatoid	Siphho	yes			
K54	SO250-9	Donsiellinid	Pseudotachidiid A	yes			
K55	SO250-9	Donsiellinid	Pseudotachidiid A	yes			
K56	SO250-9	Donsiellinid					
K57	SO250-9	Donsiellinid	Donsiella phycolimnoriae	yes	yes	yes	yes
K58	SO250-9	Donsiellinid	Xylora bathyalis	yes	yes	yes	yes
K59	SO250-9	Donsiellinid	Xylora bathyalis	yes			
K60	SO250-9	Donsiellinid	Xylora Donsiella?	yes			
K61	SO250-7	Ascothoracidae		yes	yes	yes	yes
K62	SO250-37	Tantulocarida					
K63	SO250-37	Parameiropsis		yes	yes	yes	yes
K64	SO250-7	Cryptoniscoid Larva		yes	yes	yes	yes
K65	SO250-40	Nicothoidae	Gen?	yes	yes	yes	yes
K66	SO250-40	Betamorpha, Munnopsidae		yes			
K67	SO250-43	Cyclopoid					
K68	SO250-43	Cyclopoid		yes			
K69	SO250-43	Argestidae f		yes	yes	yes	
K70	SO250-43	Parameiropsis		yes	yes	yes	yes
K71	SO250-43	Parameiropsis					
K72	SO250-43	Parameiropsis		yes			

K73	SO250-43	Parameiropsis		yes			
K74	SO250-43	Marsteinia m			yes	yes	
K75	SO250-43	Perucamptus				yes	
K76	SO250-43	Pseudotachidius					
K77	SO250-43	Talpina		yes	yes		
K78	SO250-43	Talpina		yes	yes	yes	yes
K79	SO250-43	Perucamptus/Mandible		yes	yes	yes	yes
K80	SO250-17	Cerviniid		yes			
K81	SO250-17	Cerviniid		yes			
K82	SO250-17	Cerviniid male					
K83	SO250-17	Cerviniid male		yes			
K84	SO250-17	Cerviniid		yes			
K85	SO250-17	Pseudotachidius					
K86	SO250-17	Diossaccinae					
K87	SO250-17	Cerviniid		yes			
K88	SO250-30	Pseudotachidius		yes			
K89	SO250-30	Pseudotachidius		yes			
K90	SO250-30	Pseudotachidius		yes			
K91	SO250-30	Pseudotachidius		yes			
K92	SO250-30	Mesocletodes		yes			
K93	SO250-30	Pontostratiotes		yes			
K94	SO250-30	Pontostratiotes					
K95	SO250-30	Schminkepinellid			yes	yes	yes
K96	SO250-28	Pontostratiotes					
K97	SO250-28	Pontostratiotes					
K98	SO250-39	Schminkepinellid		yes	yes		yes
K99	SO250-37	Paranannopus		yes	yes	yes	
K100	SO250-37	Metahuntemannia		yes	yes	yes	yes
K101	SO250-37	Schminkepinellid	Einslepinella mediana	yes	yes	yes	
K102	SO250-37	Schminkepinellid	Cyclopinella sp	yes	yes	yes	
K103	SO250-37	Marsteiniidae		yes	yes	yes	yes
K104	SO250-37	Parameiropsis		yes	yes	yes	yes
K105	SO250-37	Bathypsammis		yes	yes	yes	
K106	SO250-37	Metahuntemannia male			yes	yes	
K107	SO250-37	Schminkepinellid	Cyclopinella	yes	yes	yes	yes
K108	SO250-37	Parameiropsis male		yes	yes	yes	yes
K109	SO250-40	Cerviniid	Cervinia magda n.sp cop	yes	yes	yes	yes
K110	SO250-40	Cerviniid	Cervinia magda n.sp cop	yes			
K111	SO250-40	Pseudotachidius	Pseudotachidius bipartitus pacificus				
K112	SO250-40	Pseudotachidius	Pseudotachidius bipartitus pacificus	yes	yes	yes	yes
K113	SO250-40	Pseudotachidius	Pseudotachidius bipartitus pacificus	yes			
K114	SO250-40	Pseudotachidius	Pseudotachidius bipartitus pacificus	yes			
K115	SO250-40	Pseudotachidius	Pseudotachidius bipartitus pacificus				
K116	SO250-40	Pseudotachidius	Pseudotachidius bipartitus pacificus				
K117	SO250-42	Archinotodelphyidae	Archinotodelphys n.sp.	yes	yes	yes	yes
K118	SO250-42	Archinotodelphyidae	Archinotodelphys n.sp.	yes	yes	yes	yes
K119	SO250-42	Pseudotachidius	Pseudotachidius bipartitus				

			pacificus				
K120	SO250-42	Pseudotachidius	Pseudotachidius bipartitus pacificus				
K121	SO250-42	Pseudotachidius	Pseudotachidius bipartitus pacificus				
K122	SO250-42	Cerviniid	Pseudocervinia magda n.sp cop	yes			
K123	SO250-42	Cerviniid	Pseudocervinia magda n.sp cop	yes	yes	yes	yes
K124	SO250-42	cerviniella	Cerviniella hyunsui n.sp	yes	yes	yes	yes
K125	SO250-5	Aegisthinae Nudivorax?	Nudivorax sp		yes	yes	yes
K126	SO250-36	Cletodidae	Cletodes n.sp.1	yes			
K127	SO250-23	Aegisthinae Nudivorax?	Nudivorax n. sp2 Female	yes	yes	yes	yes
K128	SO250-23	Aegisthinae Nudivorax?	lost	yes			
K129	SO250-61	Cerviniella	Cerviniella sp.3 hayatoi n.sp.	yes	yes	yes	yes
K130	SO250-61	Cerviniella	Cerviniella copepodite	yes			
K131	SO250-61	Cerviniid	Stratiopontotes sp. 2	yes	yes	yes	yes
K132	SO250-61	Cerviniid	Stratiopontotes sp. 2	yes	yes	yes	yes
K133	SO250-62	Pseudomesochra	lost	yes			
K134	SO250-62	Cerviniella	Cerviniella sp.2 sim K43	yes	yes	yes	yes
K135	SO250-62	Cyclopinella?	lost				
K136	SO250-62	Cyclopinella	Cyclopinid				
K137	SO250-62	Pseudomesochra	Pseudomesochra?				
K138	SO250-53	Pseudomesochra	Pseudomesochra?	yes	yes	yes	yes
K140	SO250-53	Paranannopus	Paranannopus sim plumosus?	yes	yes	yes	yes
K141	SO250-53	Cerviniella	Cerviniella n.sp. 4. No P4 end	yes	yes	yes	yes
K142	SO250-60	Dajidae		yes	yes	yes	yes
K143	SO250-61	Isopoda Cryptoniscoida			yes	yes	yes
K144	SO250-23	Isopoda Cryptoniscoida		yes	yes	yes	yes
K145	SO250-10	Isopoda Cryptoniscoida		yes	yes	yes	yes
K146	SO250-10	Isopoda Cryptoniscoida		yes	yes	yes	yes
K147	SO250-10	Cyclopinodes n. sp.	Cyclopinoides?	yes	yes	yes	yes
k148	SO250-10	Cerviniidae male	Gen ?	yes	yes	yes	yes
K149	SO250-52	Cervinia	Pseudocervinia n.sp.2	yes	yes	yes	yes
K150	SO250-52	Cervinia	Pseudocervinia n.sp.2	yes			
K151	SO250-52	Cervinia	Stratiopontotes sp. 3	yes	yes	yes	yes
K152	SO250-10	Hase, Aegisthinae	Hase sp.3.	yes	yes	yes	yes
K153	SO250-10	Dahmsopotteckina	D. cf micracantha		yes	yes	yes
K154	SO250-10	Cerviniella	Cerviniella n.sp. 5 sashae		yes	yes	yes
K155	SO250-10	Cerviniella	Cerviniella n.sp.6	yes	yes	yes	yes
K156	SO250-10	Cerviniella	Cerviniella sp. 7 sim lagarderei but p1 exp 10setae	yes			
K157	SO250-10	Cerviniid	Brotskayaia tenuiseta	yes			
K158	SO250-10	Cerviniid	Brotskayaia tenuiseta	yes			
K159	SO250-10	Jamstecia	Jamstecia sp.		yes	yes	yes
K160	SO250-10	Cervniid	Stratiopontotes sp.4	yes			
K161	SO250-10	Pontostratiotes male	Pontostratiotes	yes			
K162	SO250-10	Cerviniopsis	Cerviniopsis sp.	yes	yes	yes	yes
K163	SO250-55	Nudivorax	Nudivorax sp.		yes	yes	yes
K164	SO250-55	Cerviniid	Pseudocervinia n.sp.2	yes			
K165	SO250-55	Cerviniid	Gen ?				
K166	SO250-55	Cerviniid	Pseudocervinia n.sp.2	yes			
K167	SO250-55	Cerviniid	Pseudocervinia n.sp.2	yes			
K168	SO250-55	Cerviniid	Pseudocervinia n.sp.2	yes			
K169	SO250-55	Cerviniid	Pseudocervinia n.sp.2	yes			

K170	SO250-55	Cerviniid		yes			
K171	SO250-61	Kereia, Pseudotachidiid	Kereia, Pseudotachidiid sp.	yes	yes	yes	yes
K172	SO250-61	Argestidae f	Argestidae f sp.	yes	yes	yes	yes
K173	SO250-61	Argestidae f	Argestidae f sp.	yes	yes	yes	yes
K174	SO250-61	Argestidae f	Argestidae f sp.	yes	yes	yes	yes
K175	SO250-86	Ambilimbus tuerkayii	Ambilimbus tuerkayii sp.	yes	yes	yes	yes
K176	SO250-86	Ambilimbus tuerkayii	Ambilimbus tuerkayii sp.	yes	yes	yes	yes
K177	SO250-86	Cyclopinella	Cyclopinella sp.		yes		yes
K178	SO250-86	Cyclopinella	Cyclopinella sp.		yes		yes
K179	SO250-31	Dendrogaster	Ascothoracida Nauplius	yes	yes	yes	
K180	SO250-64	Ophioica	Copepoda, Chordeumiidae	yes	yes	yes	
K181	SO250-85	Eunicolidae ?	(Eggs) Siphonostomatoida	yes	yes	yes	
K182	SO250-94	Tantulocarida	female parthenogenetic	yes	yes	yes	
K183	SO250-87	Cryptoniscoid Larva			yes	yes	
K184	SO250-85	Epicaridae on Cumacea		yes	yes	yes	
K185	SO250-98	Cryptoniscoid Larva		yes	yes	yes	
K186	SO250-10	Cryptoniscoid Larva			yes	yes	
K187	SO250-10	Cryptoniscoid Larva			yes	yes	
K188	SO250-10	Cryptoniscoid Larva		yes	yes	yes	
K189	SO250-49	Cryptoniscoid Larva				yes	
K190	SO250-82	Centobnaster	Centobnaster n. sp.	yes	yes	yes	
K191	SO250-82	Centobnaster	Centobnaster n. sp. (copepodite)	yes	yes	yes	
K192	SO250-86	Siphonostomatoida	Siphonostomatoida				
K193	SO250-86	Siphonostomatoida	Siphonostomatoida			yes	
K194	SO250-86	Perucamthus	Perucamthus n.sp.			yes	

7.13. Parasitic Crustaceans of the Kurile-Kamchatka trench

A. Petrunina, P. Marinez Arbizu, H. Tanaka, H. Yoo

7.13.1. Objectives

Our aim was to collect various parasitic crustaceans to estimate their diversity and host specificity in the deep-sea environment.

7.13.2. Work at sea

We managed to collect vast amounts of material from various gear deployments.

7.13.3. Preliminary results

From the material sorted live on board we identified four main groups of crustacean parasites: Copepoda, Ascothoracida, Tantulocarida and Isopoda (see chapter 7.21 by Golovan and Petrunina).

1.1.1.1. Copepoda

Copepods contain more than one third of parasitic and symbiotic species. These are known to infest a wide range of vertebrate and invertebrate animals, including other crustaceans. The family Nicothoidae (order Siphonostomatoida) represents specific parasites of Peracarids. We found nicothoid copepods on specimens from two isopod genera: *Syneurycope* and *Betamorpha*. Two specimens of *Syneurycope* were infested with *Rhizorhina sp.* There were in total three bulb shaped females attached to the ventral part of the host body between the pereopods and seven copepodite stages associated with these females. Close investigation of one of these copepodites revealed two spermatophores inside the cephalothorax. Thus, some of these copepodites could in fact be neotenic males, while the others are more likely underdeveloped males.

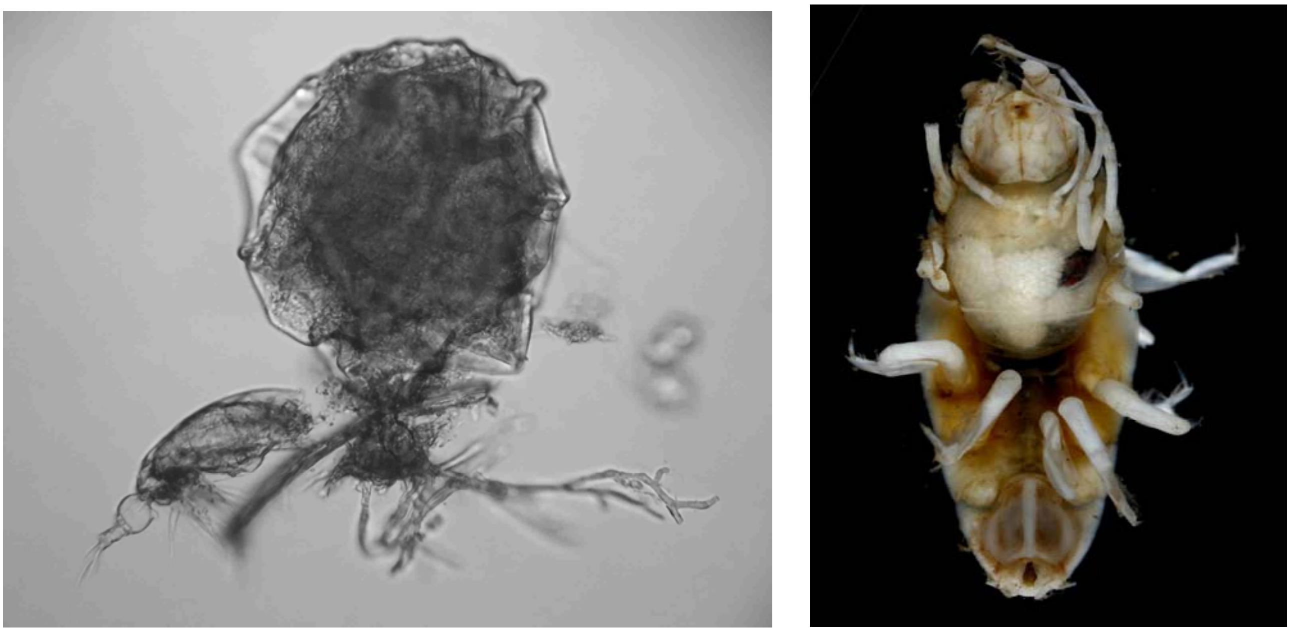

Fig. 46: *Rhizorhina sp*. female with rootlet system and a copepodite. © Alexandra Petrunina *Betamorpha sp*. with *Sphaeronella* in marsupium. © Anastassya Maiorova.

Adult females of Rhizorhina are completely transformed and do not have any of the arthropod characters. The spherical body is permanentely attached to the host with the system of rootlets located inside the host tissues. These rootlets are probably used also for absorbtion of nutrients.

One specimen of *Betamorpha c.f. acuticoxalis* was infested with another nicothoid copepod probably *Sphaeronella sp*. These parasites are known to occupy the brooding chamber of their peracarid hosts (Isopods, Tanaids.) One adult female with 11 detached egg sacs and 3 copepodites were stored inside the marsupium of *Betamorpha* (Station 40, EBS). Thus, the female producing a lot of egg sacs is not attached to the host but it is maintained in the brooding chamber as if this was the eggs of the host itself. *Sphaeronella* differs from *Rhizorhina* by having rudimental head with some remnants of cephalic appendages and even some reduced legs. The copepodites sitting close to the female could as well be neotenic males, or at least the predecessing copepodite stage that will moult into males soon.

Several species of siphonostomatoid copepods were found on various polychaetes, including beautiful *Eunicolidae* gen. sp. attached to the dorsal side of the Polychaeta gen. sp. (Station 85, EBS).

Fig. 47: *Eunicolidae* gen. sp. (Copepoda: Siphonostomatoida) on a polychaete host. © *Ulrike Minzlaff.*

1.1.1.2. Ascothoracida

Ascothoracida is a small group of parasitic and symbiotic crustaceans from two big invertebrate taxa: Cnidaria: Anthozoa and Echinodermata. Among echinoderms most of the classes can provide hosts for Ascothoracida: Asteroidea, Ophiuroidea, Crinoidea, Echinoidea. Several specimens of Ascothoracida from two families parasitic on sea stars and ophiuroids were collected using Agassiz Trawl. The family Ascothoracidae are mesoparasites of Ophiuroidea, inhabiting genital bursae of their host. Two species of this family (*Parascothorax sp*. and *Ascothorax sp*.) were collected from two different ophiuroid species. In both cases, the cyst in the genital burasae was occupied by a very transformed female and her dwarf male.

The family Dendrogastridae comprise the most advanced endoparasites that could be found in the coelomic cavity of Asteroidea. Two specimens of *Dendrogaster sp*. were found in *Eremicaster vicinus* (St. 31) and *Eremicater crassus* (St. 64). In the first case, examination of the 78 specimens of hosts revealed only one parasite, while at St. 64 one out of four Eremicasters was already infested with Dendrogaster. The specimens contained developed nauplii that were fixed for molecular research (RNALater), as well as for morphological studies (Glutar aldehyde).

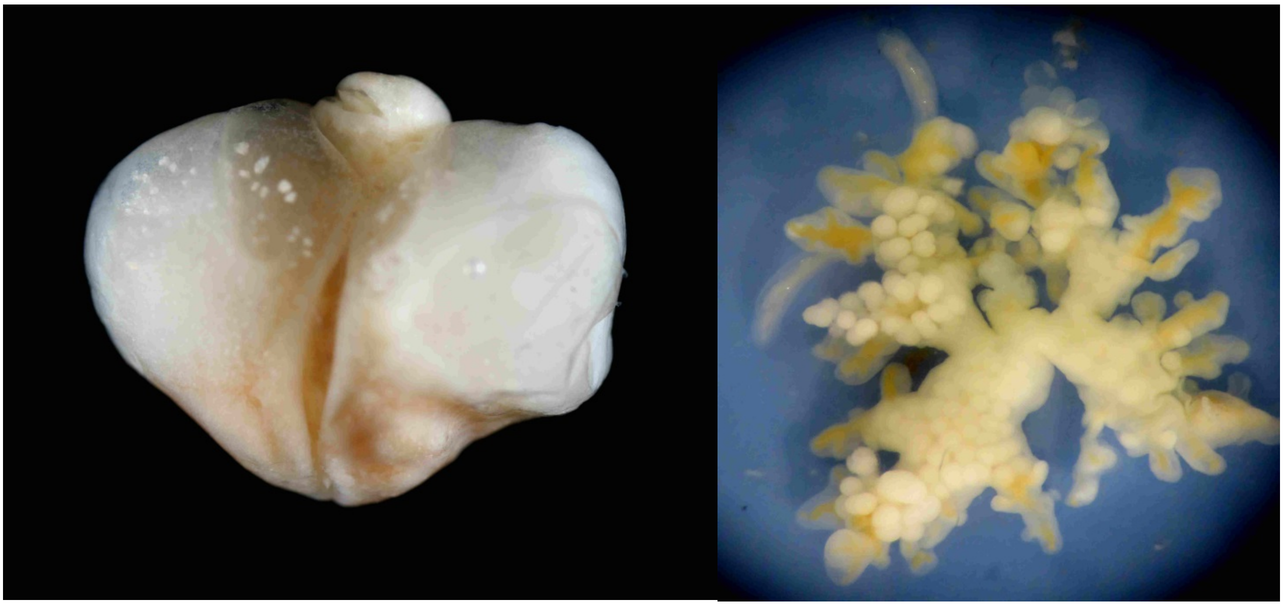

Fig. 48: *Ascothorax sp*. female and dwarf male. © Anastassiya Mayorova. *Dendrogaster* sp. from *Eremicaser crassus* © Alexandra Petrunina.

1.1.1.3. Tantulocarida

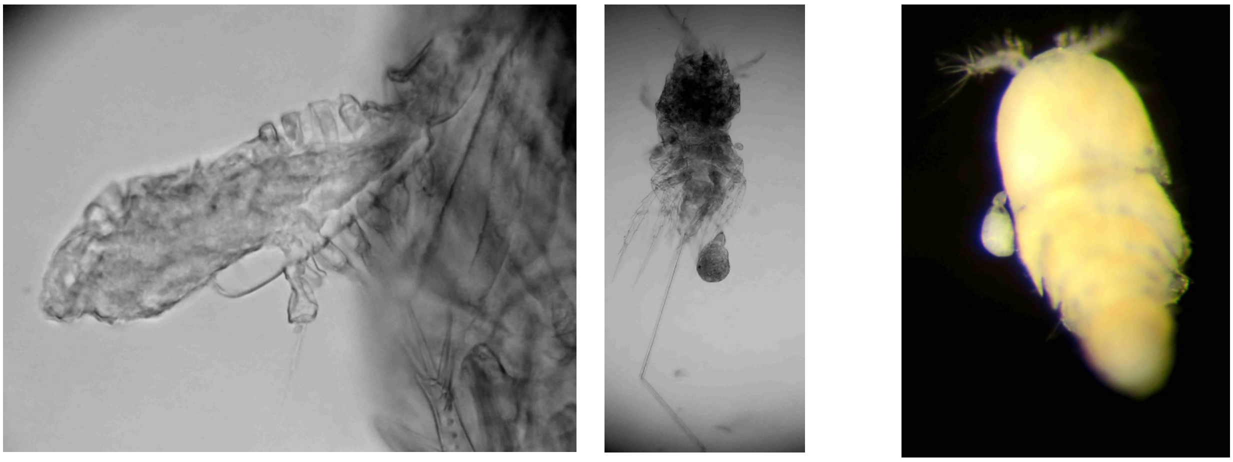

Fig. 49: Tantulocarida on *Parameiropsis sp*. (St. 36, GKG), Tantulocarida on *Nodivorax sp*. (St. 13, MSN), Tantulocarida on *Cerviniella sp*. (St. 103, AGT). © Alexandra Petrunina.

Parasitic stages of the Tantulocarida were found in 7 sampling areas (A1, A2, A3, A5, A9, A10, A11) covering whole range of depths. Except of two specimens all the rest were attached to different harpacticoid hosts. Diversity of the hosts was quite high: seven genera of Harpacticoida were identified so far. Harpacticoids infected with Tantulocarida were found in samples from all gears: MUC, GKG, EBS, AGT and even MSN. The last gear was not supposed to bring any material, however at the two stations two specimens of *Nodivorax sp*. (Copepoda: Harpacticoida) with tantulocaridan parasites were found at depths 5900-3000m. In both cases the multinet was not reaching the bottom, as the depths were more than 8100m, which means that the hosts of the parasites were dwelling in plankton. This constitutes the first record of Tantulocarida infesting planktonic crustaceans. At station 86 (A10) two specimens of tantulocaridans were found attached to the isopods of the family Macrostyllidae. This represents only the forth record of the Tantulocarida from isopod host. Tantulocaridans were found at all depths including the deepest station (St. 103, 9520m). All our samples are the deepest records for the Tantulocarida so far.

Area A9 was remarkably rich in Tantulocarida: live sorting of samples from GKG, MUC and AGT already revealed 18 specimens of infested hosts, while the total number of parasites was 26.

7.14. Species diversity of Ostracoda (Crustacea) of the abyssal to hadal depth in the Kuril-Kamchatka Trench

H. Tanaka, H. Yoo

7.14.1. Objectives

Ostracoda is a class of small bivalved crustacean that inhabits various kinds of aquatic environments, with a biodiversity of over 20,000 estimated living species (Horne 2005). Nevertheless, as for the benthic ostracods, only 6 species (including unidentified species) has been reported from the water depth deeper than 6000 m (Rudjakov, 1961; Maddocks, 1969; Hartmann, 1985; Schornikov, 1987; Beliaev, 1989). The carapace and appendage are described and named for three species of them: *Krithe setosa* Rudjakov, 1961 (6487 m), *Zabythocypris helicina* Maddocks, 1969 (6134 m), and *Zabythocypris chinukensis* Schornikov, 1980 (6065 m). Schornikov (1987) reported the empty carapace of *Retibythere* (*Bathybythere*) *scaberrima scaberrima* (Brady, 1886) from 7950-8100 m depth of the Puerto-Rico Trench. The remaining two species are reported by Beliaev (1966) and identified only family and genus level, respectively: Bairdiidae sp. (6920-7657 m) and *Bairdia* sp. (7000-7170 m). Our primary purpose of this KuramBio2 expedition is the exploration of abyssal and hadal species of ostracods in the Kuril-Kamchatka Trench.

7.14.2. Work at sea

Samples were collected by multi net (MSN), box corer (GKG), multiple corer (MUC), Agassiz trawl (AGT), epibenthic sledge (EBS). Ostracod specimens were sorted under a stereo-binocular microscope and preserved in 99% denatured EtOH. On board of RV *Sonne*, obtained ostracods were identified into generic or family level.

7.14.3. Preliminary results

A total 14 families 18 genera of ostracods were identified at 12 stations. The most dominant genus is *Krithe* which found from 9 stations (ca. 5100 to 9300 m depth) (Fig. 50). *Krithe* sp. was obtained from area A11 of water depth ca. 9300 m by using GKG (SO250_100). This is the deepest record of benthic Ostracoda up to date. Our investigation in the Kuril-Kamchatka Trench revealed that ostracods distribute widely in abyssal to hadal depth. Below we show the list of species collected by this expedition (table 17).

Table 17. Abbreviations of life style: P, Planktonic; B, Benthic; NB, Nekto-benthic

Station	Gear	Depth	Species info.	Life style
SO250_3	MSN	5,145m	Fam. Halocyprididae; Conchoecinae: 4 species	P
SO250_5	MUC	5,149m	Fam. Krithidae: *Krithe* sp.	B
SO250_6	GKG	5,145m	Fam. Krithidae sp.	B
			Fam. Cytheruridae: *Cytheropteron* sp.	B
			Fam. Pontocyprididae: *Argilloecia* sp.	B
			Fam. Trachyleberididae: *Acanthocythereis* sp.	B
SO250_8	EBS	5,134m	Ord. Podocopida: 2 species	B
			Fam. Halocyprididae; Bathyconchoecinae: 3 species	P
			Fam. Philomedidae sp.	NB
			Fam. Polycopidae sp.	NB
			Fam. Pontocyprididae: *Argilloecia* sp.	B
			Fam. Krithidae: *Krithe* sp.	B
			Fam. Trachyleberididae: *Abyssocythere* sp.	B
			Fam. Trachyleberididae: *Marwickcythereis* sp.	B
			Fam. Trachyleberididae: *Croninocythereis* sp.	B
			Fam. Trachyleberididae: *Anebocythereis* sp.	B
SO250_9	AGT	5,134m	Fam. Bairdiidae sp.	B
			Fam. Keysercytheridae: *Keysercythere*: 2 species	B
			Fam. Paradoxostomatidae: *Redekea?* sp.	B
SO250_10	EBS	5,119m	Ord. Podocopida: 2 species	B
			Fam. Philomedidae sp.	NB
			Fam. Pontocyprididae: *Argilloeci*a sp.	B
			Fam. Halocyprididae: Bathyconchoecinae: 3 species	P
			Fam. Polycopidae sp.	NB
			Fam. Cylindroleberidae sp.	B
SO250_13	MSN	0-250m	Fam. Halpcyprididae: Conchoecinae: 2 species	P
SO250_13	MSN	1,000-3,000m	Fam. Halpcyprididae: Conchoecinae: 2 species	P
SO250_13	MSN	3,000-5,900m	Fam. Halpcyprididae: Conchoecinae: 2 species	P
SO250_14	GKG	8,250m	Fam. Krithidae: *Krithe* sp.	B
SO250_15	MUC	8,250m	Fam. Cytheruridae: *Cytheropteron* sp.	B
SO250_17	EBS	8,185m	Fam. Halocyprididae: Bathyconchoecinae: 2 species	P
SO250_19	EBS	8,192m	Fam. Halocyprididae: Bathyconchoecinae sp.	P
SO250_20	AGT	8,191m	Fam. Krithidae: *Krithe (Profundocythere)* sp.	B
			Fam. Cytheruridae: *Cytheropteron* sp.	B
SO250_23	MSN	1,000-3,000m	Fam. Halpcyprididae; Conchoecinae sp.	P
SO250_23	MSN	250-500m	Fam. Halpcyprididae; Conchoecinae sp.	P
SO250_24	GKG	6,064m	Fam. Pontocyprididae: *Argilloecia* sp.	B
SO250_25	GKG	6,066m	Fam. Krithidae: *Krithe* sp.	B
			Fam. Pontocyprididae: *Argilloecia* sp.	B

SO250_26	MUC	6,064m	Fam. Krithidae: *Krithe (Profundocythere)* sp.	B
SO250_27	MUC	6,065m	Fam. Krithidae: *Krithe (Profundocythere)* sp.	B
SO250_30	EBS	6,228m	Fam. Halocyprididae: Bathyconchoecinae sp.	P
SO250_34	MSN	450-500m	Fam. Halpcyprididae: Conchoecinae sp	P
SO250_34	MSN	500-1,000m	Fam. Halpcyprididae: Conchoecinae sp.	P
			Fam. Cypridinidae: *Gigantocypris* sp.	P
SO250_36	GKG	7,134m	Fam. Krithidae: *Krithe (Profundocythere)* sp.	B
SO250_37	GKG	7,133m	Fam. Krithidae: *Krithe (Profundocythere)* sp.	B
			Fam. Pontocyprididae: *Argilloecia* sp.	B
SO250_38	MUC	7,137m	Fam. Pontocyprididae: *Argilloecia* sp.	B
SO250_39	MUC	7,137m	Fam. Pontocyprididae: *Argilloecia* sp.	B
SO250_40	EBS	7,300m	Fam. Halocyprididae: Bathyconchoecinae sp.	P
SO250_42	EBS	7,110m	Fam. Halocyprididae: Bathyconchoecinae sp.	P
			Fam. Polycopidae sp.	NB
SO250_49	GKG	8,738m	Fam. Cytheruridae: *Cytheropteron* sp.	B
SO250_51	MUC	8,734m	Fam. Cytheruridae: *Cytheropteron* sp.	B
SO250_53	MUC	9,013m	Fam. Cytheruridae: *Cytheropteron* sp.	B
SO250_55	EBS	8,743m	Fam. Halocyprididae: Bathyconchoecinae sp.	P
SO250_61	GKG	5,740m	Superfam. Cytheroidea sp.	B
			Fam. Polycopidae sp.	NB
			Fam. Krithidae: *Krithe* sp.	B
			Fam. Pontocyprididae: *Argilloecia* sp.	B
			Spiny one	B
SO250_62	MUC	5,742m	Fam. Pontocyprididae: *Argilloecia* sp.	B
			Fam. Polycopidae sp.	NB
			Fam. Cytheromatidae: *Cytheroma*? sp.	B
SO250_63	MUC	5,743m	Fam. Pontocyprididae: *Argilloecia* sp.	B
			Fam. Polycopidae sp.	NB
			Fam. Krithidae: *Krithe* sp.	B
			Superfam. Cytheroidea sp.	B
			Fam. Paradoxostomatidae: *Cytherois*? sp.	B
SO250_74	MUC	8,225m	Fam. Krithidae: *Krithe (Profundocythere)* sp.	B
SO250_75	GKG	8,220m	Fam. Krithidae: *Krithe (Profundocythere)* sp.	B
			Fam. Polycopidae sp.	NB
SO250_77	EBS	9,427m	Fam. Halocyprididae: Bathyconchoecinae sp.	P
SO250_82	GKG	5,220m	Fam. Paradoxostomatidae: *Cytherois*? sp.	B
			Spiny one	B
SO250_83	MUC	5,211m	Fam. Polycopidae sp.	NB
			Fam. Krithidae: *Krithe* sp.	B
			Fam. Paradoxostomatidae: *Cytherois*? sp.	B
SO250_84	MUC	5,217m	Fam. Bythocytheridae: *Pseudocythere?* sp.	B

SO250_86	AGT	5,571m	Fam. Philomedidae sp.	NB
			Fam. Pontocyprididae sp.	B
			Fam. Krithidae: *Krithe* sp.	B
			Spiny one	B
SO250_90	AGT	8,271m	Fam. Krithidae: *Krithe* sp.	B
SO250_94	GKG	6,530m	Fam. Krithidae: *Krithe* sp.	B
SO250_95	MUC	6,517m	Ord. Podocopida sp.	B
			Fam. Polycopidae sp.	NB
SO250_96	MUC	6,517m	Ord. Podocopida sp.	B
			Fam. Polycopidae sp.	NB
			Fam. Krithidae: *Krithe (Profundocythere)* sp.	B
			Fam. Pontocyprididae: *Argilloecia* sp.	B
SO250_98	AGT	6,440m	Fam. Krithidae: *Krithe (Profundocythere)* sp.	B
			Fam. Krithidae: *Krithe* sp.	B
			Fam. Polycopidae sp.	NB
			Fam. Bythocytheridae: *Vitjasiella* cf. *belaevi*	B
			Fam. Bythocytheridae: *Retibythere (Bathybythere)* sp.	B
SO250_100	GKG	9,300m	Fam. Krithidae: *Krithe* sp.	B
SO250_102	EBS	9,500m	Fam. Halocyprididae: Bathyconchoecinae sp.	P

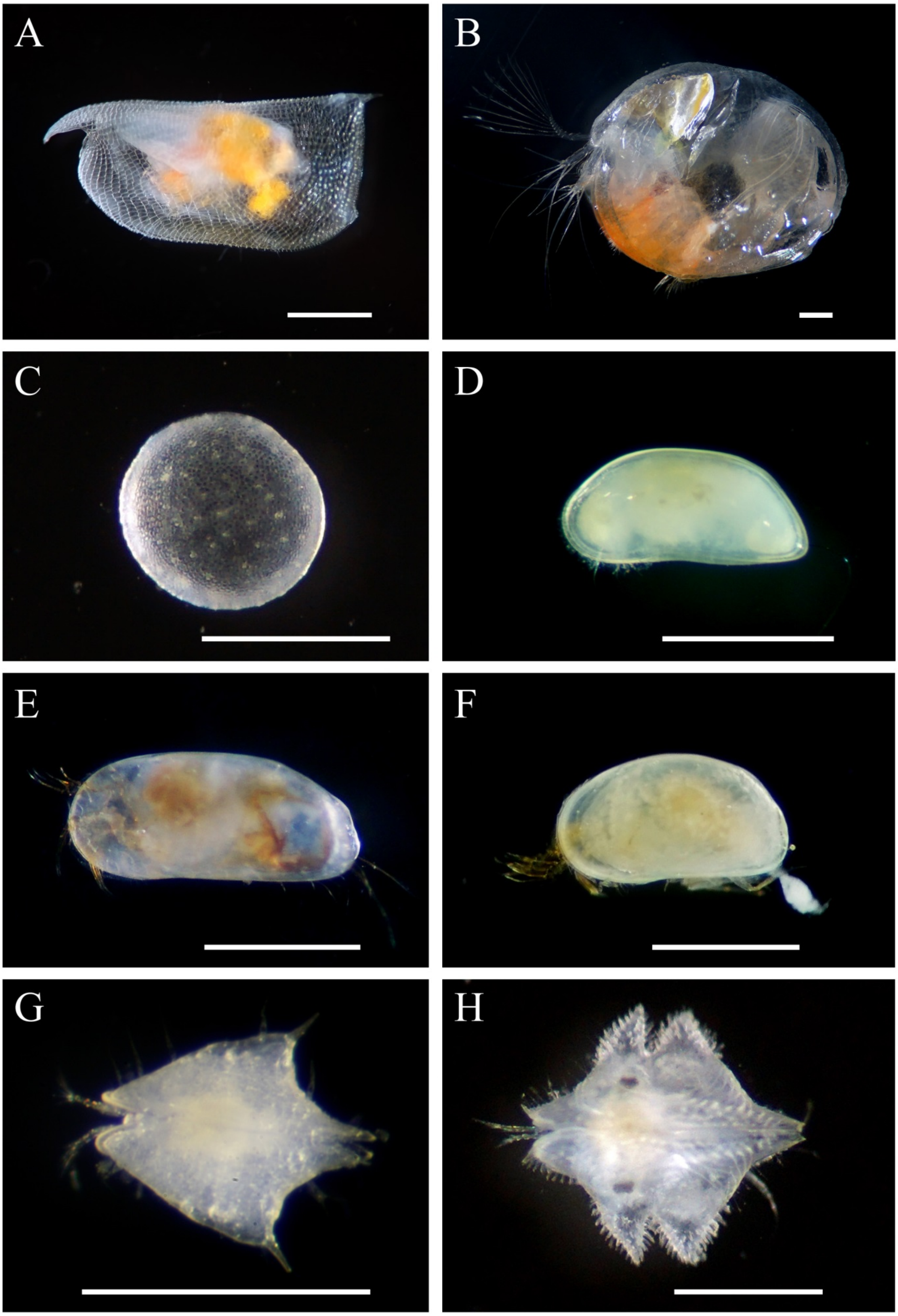

Fig. 50: Photographs of Ostracoda collected during the SO250 expedition. A, *Conchoecissa plinthina* (Halocyprididae); B, *Gigantocypris* sp. (Cypridinidae); C, *Archypolycope* cf. *rotunda* (Polycopidae); D, *Argilloecia* sp. (Pontocyprididae); E, *Krithe* sp. (Krithidae); F, *Krithe* (*Profundocythere*) sp. (Krithidae); G, *Cytheropteron* sp. (Cytheruridae); H, *Retibythere*

(*Bathybythere*) cf. *scaberrima* (Bythocytheridae). A-F, left lateral view. G and H, dorsal view, left side is anterior direction. Scale bars indicate 1 mm for A and B, and 0.5 mm for C-H.

7.15. Abundance, diversity and trophic relation of nematodes

V. Mordukhovich

7.15.1. Objectives and background

Nematodes are usually the dominant metazoans in the deep-sea benthic communities. Usually nematodes are considered as a part of the meiofauna, but very long, robust nematodes are often excluded from studies by using a 1.00-mm sieve to separate the smaller fauna from the macrofauna. However nematodes regularly occur in macrobenthic samples and can have high abundance. Despite their dominance, the composition of deep-sea nematode assemblages is still scarcely studied. Deep-sea nematofauna of the North-Western Pacific is one of the least studied regions.

The intention of the current study is to collect samples of nematodes for investigation of abundance, distribution, trophic relations and community structure of nematodes from meio- and macrofauna. The obtained data will be compared with other regions of World Ocean. The descriptions of new species, alongside with DNA barcoding, are also planned.

7.15.2. Work at sea

To obtain the nematodes we used a multicorer (MUC), a boxcorer (GKG), an epibenthic sledge (EBS) and an Agassiz trawl (AGT) as described in this cruise report by Martinez Arbizu et al., Kamenev et al., Brandt et al. and Minin et al. correspondingly.

For the genetic studies nematodes were fixed with DESS (MUC, GKG, AGT) and 96% undenatured ethanol (EBS); for studying of morphology the nematodes were fixed with 4% buffered formalin. For stable isotope analyses the samples were oven-dried at 60°C for at least 24 h.

7.15.3. Preliminary results and further sample treatment

Meiobenthic nematodes. For further treatment, organisms will be separated from sediments in the laboratory of the German Centre for Study of Marine Biodiversity (DZMB, Wilhelmshaven) using a Levasil®-kaolin medium (McIntyre and Warwick, 1984) and a centrifuge. Then samples will be centrifuged 3 times at 4,000 g for 6 min. After centrifugation, the upper fraction containing meiobenthic organisms will be filtered through a sieve of mesh size 32 µm and then washed with fresh water. The concentrate will be then fixed with 4% formalin (if samples were initially fixed with formalin) or with DESS (if samples were initially fixed with DESS). For sorting animals, the dye Bengal Rose will be used. This dye stains only animals, which were alive at the moment of their fixation, in red colour. This method allows selecting these animals from other organic remains in the centrifuged sample.

Macrobenthic nematodes**.** Quantitative data of the macrobenthic nematodes described in this cruise by Kamenev et al. The most abundant families were Desmodoridae (Figure 1), Leptosomatidae, Oncholaimidae, Phanodermatidae, and Thoracostomopsidae. Some morphospecies were found at all stations.

A particular interest is to study the interactions between the nematodes (including parasitism) and other animals of meio- and macrofauna. At several stations free-living individuals of Marimermithidae and Benthimermithidae were found as well as animals from different taxon (Copepoda, Foraminifera, Kinorhyncha, Echiura, Isopoda) with parasites inside (Figure 2). Marimermithidae and Benthimermithidae are quite rare marine nematodes with difficult systematics. Most species were described from very few free-living adult specimens, either males or females, and both sexes are known in only a few nominal species so far. Some species descriptions have been based on a single specimens. New findings and using of molecular data can give us very valuable information about ecology and systematics of these families.

Despite of the high abundance and diversity of nematodes in deep-sea sediments little is known about their role in deep-sea food webs, but tools like stable isotopes and fatty acid biomarkers are increasingly being used to identify potential trophic path ways (Ingels et al., 2011; Guilini et al., 2010). In order to investigate trophic relation of nematodes, 49 samples (1-41 ind./sample) were collected for stable isotope studies.

Figure 51: Different desmodorids from the Kuril-Kamchatka Trench.

Figure 52: Benthimermithid larva leaving an isopod host .

7.16. Possible food sources, food- web analysis and environmental characterization via fatty acid and stable isotope marker approaches in the area of the Kurilen- Kamtchatka Trench

Minzlaff, U., Brandt, A., Koppelmann, R.

7.16.1. Objectives

Biochemical investigations aim the environmental characterization and the trophic structure and functioning of benthic hadal communities of the Kurilen - Kamtchatka Trench by analyzing the fatty acid and lipid compositions as well as the stable isotope ratios.
The analysis of the fatty acids provide the opportunity to reconstruct diet compositions and to interpret the importance of specific food sources of each sampled specimen by applying the trophic marker approach (Dalsgaard et al. 2003). Additionally, ratios of the $\delta^{13}C$ and $\delta^{15}N$ will provide information about the trophic level of the analyzed specimens (Post 2002).
In order to obtain information throughout the benthic food web, animals representing different trophic levels were sampled with an epibenthic sledge (EBS). It is crucial to succeed in sampling a wide range of taxa but also sampling the same taxa (preferably family) at each station to compare areas and define biochemical regions or differences.
Another aim of this study is the characterization of the hadal ecosystem of the KKT. To get an overview of the bentho- pelagic coupling surface water samples of the upper water layers (20m,

60m, 150m, 1000m) were sampled with the CTD and bottom water and sediment samples were taken with the MUC at every station. Additionally various abiotic factors will be analyzed (e.g. temperature, salinity, velocities) and take into account.

7.16.2. Work at sea

Specimens for biochemistry were primarily collected with the EBS. When the gear was back on deck the cod ends were immediately brought into the cooling room (4°C) to pick the organisms while sieving. Afterwards voucher pictures were taken for final identification in cooperation with taxonomists in the home laboratory. Surface water samples (3l), collected with the CTD from the different depths, as well as the bottom water samples (1l), collected with the MUC, were filtered with a vacuum pump through precombusted (400°C for 4h) 47 mm GF/C filters in the cooling room (4°C). Sediment of the first centimeter was collected from a MUC core with a sterile spoon. All kind of samples were frozen and stored as soon as possible at -80°C.

7.16.3. Preliminary results

In total 297 samples from various gears in all areas were collected.
At 8 stations samples of surface waters from 4 different depths (20m, 60m, 150m and 1000m) were taken with the CTD. At 19 stations sediment as well as bottom water samples were collected with the MUC. A total of 249 organisms were sampled with the EBS for biochemical analyses (Table 18).
We successfully sampled taxa of the same family in the different areas, especially for the Polychaeta and the Amphipoda. Additionally we were able to sample a variety of general taxa to investigate trophic relations and different feeding types.

Table 18: Organisms sampled for biochemical analyses at each station.

station	7	8	10	17	19	28	30	40	42	52	55	65	77	85	87	89	97	102	sum
Polychaeta		4	5	9	7	4	9	6	8	4	4	2	4	8		4	5		83
Amphipoda		8	3	4	3		2	1	3	1	2	0	4	1	1	4	7	4	48
Bivalvia			2	9	1			3		1	1	1	2		2	3			25
Holothuridea	2	1			8	5		2		4	4		2	1	1	1	1	2	34
Ophiuroidea	3	3	1				2					1		0	4		3		17
Asteroidea							1										3		4
Copepoda		4	9									1	1	3			2	1	21
Cumacea								1											1
Decapoda					1														1
Isopoda															3				3
Mysidacea			1					2						1	1	2	2		9
Echinoidea	1																		1
Priapulidae										1			1						2
total																			249

7.17. Microplastics in deep sea waters and sediments

I. Int-Veen

7.17.1. Objectives

The main aim of this project is the identification of the microplastic contamination of the deep sea. For that, deep sea waters and sediments were sampled during KuramBio II. Samples were taken from depths ranging from 5143.4 to 9539.8 m using the multi corer (MUC) for sediments and from 0 to 5900 m using the multinet (MSN) for water samples. Additionally, certain samples were taken from the Agassiz trawl and the epibenthic sledge.

Plastic litter contamination is thought to be one of the most urgent manmade threats for natural environments. Particularly the oceans are affected by this contamination, followed by multifaceted negative effects for ecosystems and single organisms (Andrady 2011; Barnes, Galgani et al. 2009; Gregory 2009). Once introduced, plastics are very persistent in marine habitats, since there is no significant biological or chemical degradation. Instead of that, plastics are fragmented into smaller and smaller particles – the so-called microsplastics (< 500 µm) (Cole, Lindique et al. 2011). Although knowledge about the vertical transport routes of microplastics is insufficient, it has been ascertained that a substantial fraction sinks to the sea floor (Cole, Lindiquw et al. 2016; Wang, Tan et al. 2016). Thus, the sea floor must be presumed as a hot spot of microplastic accumulation and its deepest parts, the ocean abysses, as a final sink for marine microplastic litter (Woodall, Sanchez-Vidal et al. 2014). This project will contribute to understand the abundance and composition of microplastics in the deep sea, using the Kuril-Kamchatka Trench as an example. Furthermore, investigations on spatial differentiation of abundance and composition with depth will be conducted. The East Asian seas around Japan are exceedingly polluted with pelagic (micro-) plastics (Fischer, Elsner et al. 2015; Isobe, Uchida et al. 2015), this project will investigate a possible causal link between pelagic plastic litter and abyssal occurrence of microplastics. In previous studies on microplastics in the deep sea, the sampled depths reached around 5000 m. This project will generate initial data for sea levels below 5000 m. This will help to clarify the contribution of vertical propagation for the general spatio-temporal distribution of marine microplastics.

7.17.2. Work at sea

Sediment samples:

For examining the deep sea sediments 1 cores of the MUC were sampled per station. From 8 cores the first 5 cm of the sediment were separated en bloc and from 13 cores the first 5 cm were sliced in 1 cm steps to investigate the distribution of microplastics within the sediments. In both cases 5-8 cm of the water column above the sediment were sampled as well, in order to catch potential re-suspended particles. In total 74 sediment samples and 21 water samples were taken. All samples were stored refrigerated at -20 °C.

Plankton samples:

For examining the water column, subsamples of the MSN samples were taken at each station and from each net. The samples were split up in 2 size groups of > and < 500 µm using a stainless steel sieve. This is an important step to facilitate the subsequent lab work and analyses.

The sample fraction < 500 µm were stored refrigerated at 4°C. The sample fraction > 500 µm were visually pre-sorted using light microscopy in order to get a first insight of the microplastic content and to separate big organic matter out. Afterwards they were stored at 4°C.

Additionally to microplastics larger anthropogenic litter was collected from the Agassiz trawl (AGT) and the epibenthic sledge (EBS). All litter items were photographed, size measured and stored for further measurements.

Sample preparation in the laboratory in Germany will be conducted through a plastic-preserving enzymatic-oxidative maceration with a subsequent density separation. The final analyses will be performed by state of the art micro-Fourier Transform Infrared spectroscopy, which allows a precise and unbiased determination of the polymer origin of the plastics.

7.17.3. Preliminary results

In 14 out of 16 AGT deployments anthropogenic litter was present. Items per deployment ranged from 2 to 34. All in all 171 items were identified. The majority of 150 items were plastics (plus 9 x metal, 2x paper, 8x paint, 1x aluminum, 1x copper). Out of these 150 plastic items, 112 were fragments of larger plastics with sizes ranging from 0.8 x 0.3 cm to 46 x 62.5 cm. Furthermore, 49 items were categorized as fibers with lengths ranging from 3.9 cm to 82 cm and an average length of 18.9 cm.

In 8 out of 18 EBS deployments anthropogenic litter was found, mostly consisting out of plastic and paint items. In general the sizes of items were significantly smaller than in the AGT, except of two big fishing nets (50 x 0.7 m and 4.5 x 0.7 m), which entangled the EBS on station 77.

7.18. Sampling of the macrofauna with the giant box corer during the KuramBio II expedition

Inna Alalykina, Alexey Chernyshev, Hiroaki Fukumori, Gennady Kamenev, Anastassya Maiorova, Vladimir Mordukhovich, Hayato Tanaka, Hyunsu Yoo

7.18.1. Background

Fauna of the hadal zone of the Kuril-Kamchatka Trench is one of the most studied in the World Ocean. In the XX century (1949 - 1966) during the expeditions of RV “Vityaz” organized by P.P. Shirshov Institute of Oceanology (Moscow) 26 trawl samples were collected from depths 6080-9530 m (Belyaev, 1989). More than one half of these samples were taken from depths more than 8000 m. Based on the material from these expeditions many new species were described. Moreover, it was possible to study vertical distribution of these species, level of endemism of the trench fauna as well as to assess probable faunistic connections between Kuril-Kamchatka Trench, other trenches and abyssal plain of the Pacific Ocean.

Quantitative samples were also taken in the Kuril-Kamchatka Trench using boxcorer “Okean” (0.25 $м^2$). This allowed us to investigate quantitative distribution of benthos in general and also to concentrate at some particular taxa. However, only 5 boxcorer samples were taken at hadal depths within the framework of expeditions to the Kuril-Kamchatka Trench (Belyaev, 1989). The maximal depth of the successful quantitative sample previously was 8355 m (Filatova, 1971). Thus, no quantitative samples were so far taken at the hadal depths such as the maximal depth of the Kuril-Kamchatka Trench. Consequently, species abundance and other parameters of the hadal fauna at these depths are still poorly understood.

The main purpose of sampling using the box corer during the "KuramBio II" expedition was to gain quantitative data on the abundance, species richness and community structure of benthic animals inhabiting the hadal zone (depths more than 6000 m) of the Kuril-Kamchatka Trench and abyssal plain (depth less than 6000 m) adjacent to the Kuril-Kamchatka Trench. The planned research tasks also include a comparative analysis of the species composition and quantitative parameters of the hadal fauna from different depths of the Kuril-Kamchatka Trench, as well as the abyssal fauna of the area of the Pacific Ocean near the Kuril-Kamchatka Trench.

7.18.2. Work at sea

For our station work we used a giant box corer (BC) (Figure 1). With its defined sample-area, the samples of this gear can be used for qualitative and quantitative analyses. The empty GKG has a weight of 1000 kg. The dimension of one box is 0.5 m x 0.5 m, representing a sampling area of 0.25 m^2. The wire speed during the lowering of the BC was 1.0-1.5 m/s until 50 m above the sea floor. Then the winch was stopped to reduce swinging. After this procedure the gear was driven down to the ground with 0.3-0.5 m/s wire speed. When the gear touched the ground, 8 to 10 m of extra wire was paid out to compensate for the movement of the ship. The BC was standing at the ground for approximately 1-2 minutes and then was lifted at 0.3-0.5 m/s in order to get it out off the ground carefully and to reduce the disturbance of the sediment. The gear was holstered with a wire speed of 1.0-1.2 m/s until the BC appeared at the surface. All operations at the sea floor were monitored and documented by a tension metre at the winch. The data was protocoled, with the local time and the date when the gear touched the ground taken each time. In total we took samples at 11 stations (Table 1). At each station, the material collected by one box corer was used. All deployments were successful, except of station 49 (area 4) where the bottom sediment was represented by very fine and liquid silt. The gear sank completely into the sediment that the surface layer was lost. Once the gear was back on deck and the box removed, the surface water was removed through a 300 µm mesh-sized sieve and a picture of the in situ surface was taken (Figure 2). Eventually, large specimens sitting on the surface were picked.

Fig. 53: Giant box corer.

Fig. 54: Sieving of the overlaying water (upper) and the upper layer of bottom sediment collected by the box corer (lower).

The subsampling process started with the upper 2 cm. This layer was carefully sieved through small sieves of 1000-, 500- and 300-µm mesh sizes in order to divide the sample into different fractions. For the second layer (2-20 cm), the sediment was sieved through a 1000 µm sieve equipped in a big bucket with seawater. The flow through was then sequentially washed through 500-µm mesh size sieves. The sieves were carefully dipped into the water several times to prevent damages to the animals. Additionally, the samples were kept on ice during the sieving process. The 1,000 µm fraction of the sediment was sorted in seawater using stereomicroscopes immediately after sieving, while the 500 µm fraction was fixed and sorted later. The separated animals from 1,000 µm fraction were fixed in 96% undenatured ethanol or 4% formalin.

For the analysis of macrofaunal nematodes (e.g. fatty acids, stable isotope composition, taxonomy, and anatomy), material from the BC corer was taken at all stations. The upper 20 centimeters of cores were sieved (500 µm) on ice to keep the organisms in a fresh condition and picked out for further fixation according to subject of study.

7.18.3. Preliminary results

Eleven samples from abyssal and hadal depths of the Kuril-Kamchatka Trench (from 5146 m to 9540 m) were obtained using giant box corer. Three samples were taken from abyssal depths of less than 6000 m, while eight samples were taken from hadal depths (more than 6000 m). All BC deployments, except those at station 49 (area 4), were successful. Sampling at station 49 (A4) were attempted at maximal depths of this part of the KKT (8739 m.) At this site the sediment was represented by a thick layer of fine and very liquid clay (Table 19). Despite very short bottom contact time the heavy gear sank completely in the sediment. Thus, upper layer of the oxidized sediment was washed away and the box corer brought on deck only deeper layers of lifeless clay. At the abyssal depths the sediment was represented by very dense silty clay or just by silt with soft oxidized surface layer 2 to 11 cm thick.

A total number of 8338 specimens of animals belonging to 30 taxa was obtained from the BC samples. These include various meiobenthic groups such as Kinorhyncha, Harpacticoida, Ostracods and Nematodes (Table 20). Nematodes were the most abundant group (66%) (Figure 3). They as well dominated (more than 50%) at each of the stations (Figure 4). At station 6 (A8, 5146 m) nematodes were not counted. In macrobenthos (animals with body size more than 1 mm) Polychaeta and Bivalvia were the two dominant groups. Both polychaetes and bivalves were found in all the samples and their total abundance excluding meiobentic animals (kinorhynchs, nematodes, harpacticoids, ostracods) was 54% and 22% respectively (Figures 5, 6).

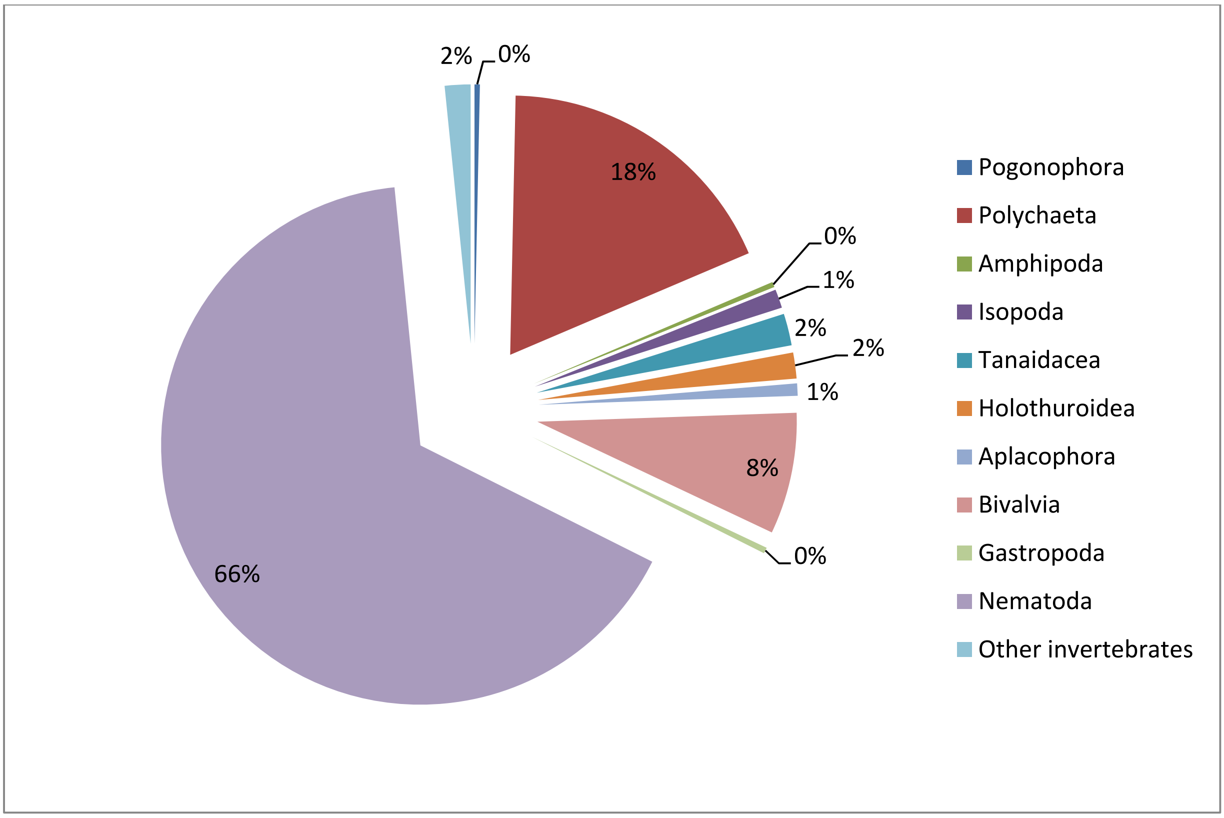

Fig. 55: Percentage of taxa of the box-corer samples.

Table 19: Coordinates, date, time, depth and sediment structure for each BC deployment.

Station	Date	Local time (BC on ground)	Latitude (N)	Longitude (E)	Depth (m)	Sediment structure
6 (A8)	18.08.2016	13:39:46	43° 49,197'	151° 45,609'	5497	Fine, brown, oxidized silty clay on surface (to 5.5 cm), in the deep dense, greyish-olive clay
14 (A1)	21.08.2016	9:18:19	45° 50,879'	153° 47,991'	8251	Fine, brown, oxidized clayer-silt on surface (to 9 cm), in the deep dense, olive clay
25 (A6)	25.08.2016	7:33:57	45° 55,235'	152° 47,464'	6068	Liquid, very fine, brown, oxidized clayer-silt on surface (to 2 cm), in the deep fine, very soft, olive silty-clay
37 (A5)	28.08.2016	14:52:54	45° 38,604'	152° 55,911'	7136	Fine, brown, oxidized silty-clay on surface (to 7 cm), in the deep dense, olive silty-clay with mixture sand
49 (A4)	04.09.2016	22:54:41	45° 28,752'	153° 11,649'	8739	Liquid, very fine, brown, oxidized clay on surface (to 1 cm), in the deep very fine and soft, grayish-olive clay
61 (A3)	08.09.2016	16:08:11	45° 9,997'	153° 45,419'	5741	Fine, soft, nearly liquid, oxidized, brown clay on surface (to 11 cm), in the deep friable greenish clay
67 (A7)	10.09.2016	8:42:44	45° 12,944'	152° 42,844'	9495	Very fine, soft, oxidized, brown clay on surface (to 3 cm), in the deep dense grayish-olive clay
75 (A9)	12.09.2016	8:42:38	44° 39,883'	151° 28,136'	8221	Very fine, soft, oxidized, brown clay on surface (to 10 cm), in the deep dense olive clay with horizontally oriented black streaks
82 (A10)	14.09.2016	21:12:26	45° 01,363'	151° 02,899'	5220	Fine, oxidized, brown silt on surface (to 3 cm), in the deep very dense grayish-olive silt with mixture sand
94 (A2)	18.09.2016	3:54:30	44° 06,852'	151° 25,539'	6531	Fine, soft, oxidized, brown silty-clay on surface (to 8 cm) with mixture of gravel, in the deep very dense olive clay with smell of hydrogen sulphide
105 (A11)	22.09.2016	4:46:10	44° 12,391'	150° 36,006'	9540	Very fine, oxidized, brown clayer-silt on surface (to 5 cm), in the deep soft, homogenous, grayish-olive clay

Table 20. Abundance (number of specimens) of the different taxa per BC sample.

	Area	**A1**	**A3**	**A5**	**A6**	**A7**	**A8**	**A9**	**A10**	**A2**	**A11**	**Total**
	Station	**14**	**61**	**37**	**25**	**67**	**6**	**75**	**82**	**94**	**105**	
	Depth, m	**8251**	**5741**	**7134**	**6066**	**9492**	**5146**	**8221**	**5222**	**6523**	**9540**	
Annelida	Pogonophora	0	0	0	0	16	0	0	2			**24**
	Polychaeta	16	149	190	68	175	28	125	93	118	241	**1311**
Cephalorhyncha	Kinorhyncha	0	25	0	0	0	3	0				**40**
	Priapulida	1	0	3	0	0	0	0	3	4		**11**
Chaetognatha	Chaetognatha	0	0	1	0	0	0	0				**1**
Cnidaria	Anthozoa	0	2	2	0	0	0	0			1	**5**
	Hydrozoa	1	0	0	0	0	0	0				**1**
	Scyphozoa	0	0	0	0	0	1	0				**1**
Crustacea	Crustacea	0	1	0	0	0	0	0				**1**
	Amphipoda	0	8	0	1	0	5	3	3	3		**23**
	Copepoda	20	41	179	25	29	40	109	32	372	6	**1050**
	Cumacea	0	0	0	0	0	1	0		2		**3**
	Euphausiacea	1	0	0	0	0	0	0				**1**
	Isopoda	2	8	1	3	0	12	18	27	10		**84**
	Ostracoda	3	20	11	5	0	14	2	5	3		**65**
	Tanaidacea	0	32	6	6	3	29	6	33	26		**143**
Echinodermata	Echinoidea	0	2	0	0	0	0	0		2		**4**
	Holothuroidea	6	7	1	0	6	3	21	1	6	23	**116**
Hemichordata	Enteropneusta	1	0	3	0	0	0	7			2	**14**
Indet.	Indet.	0	5	0	0	0	1	0				**6**
Mollusca	Aplacophora	0	4	14	4	0	2	27	1	3		**55**
	Bivalvia	27	15	20	3	104	13	65	14	8	111	**544**
	Gastropoda	1	4	1	1	18	1	0	1			**27**
	Scaphopoda	0	5	0	0	0	1	0		4		**10**
Nematoda	Nematoda	226	349	649	134	279	0	636	505	763	116	**4740**
Nemertea	Nemertea	0	1	1	0	0	4	2		2		**10**
Porifera	Porifera	0	0	0	0	0	4	0			1	**5**
Sipunculida	Sipuncula	0	1	0	0	0	1	0	2	10		**14**
	Echiura									1	5	**7**
	Ascidiacea								1			**1**
										21		**21**
Total		**305**	**679**	**1082**	**250**	**630**	**155**	**163**	**1021**	**723**	**1358**	**8338**

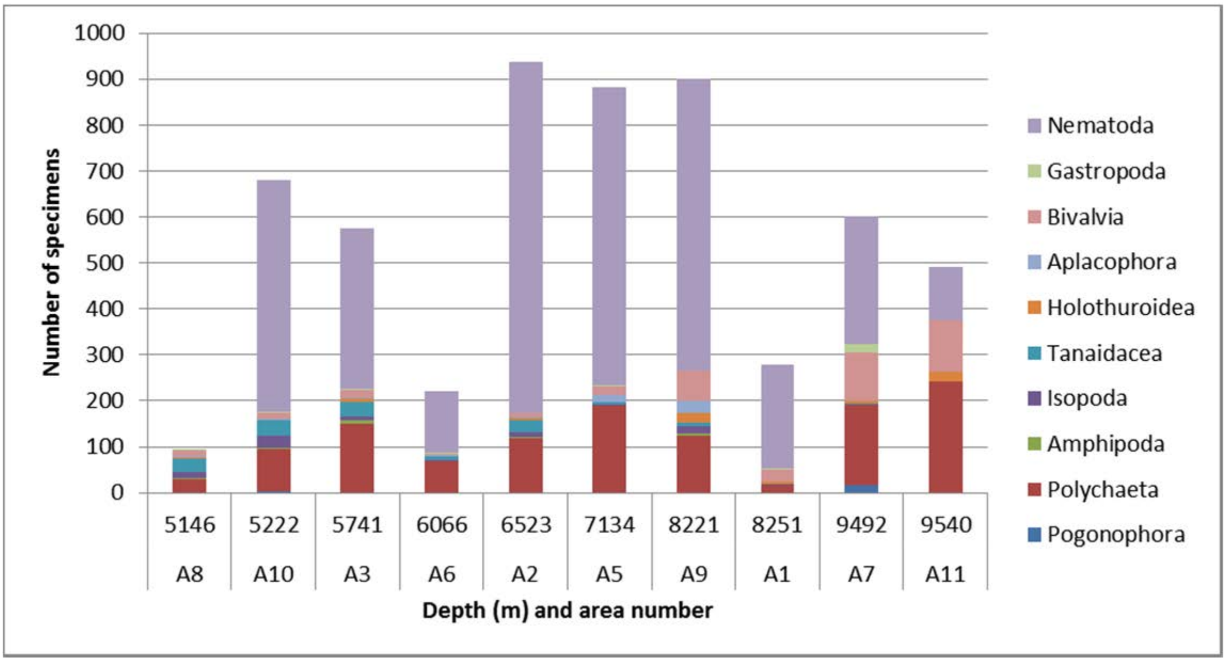

Fig. 56: Abundance and percentage of the dominant taxa found at the different depths and areas.

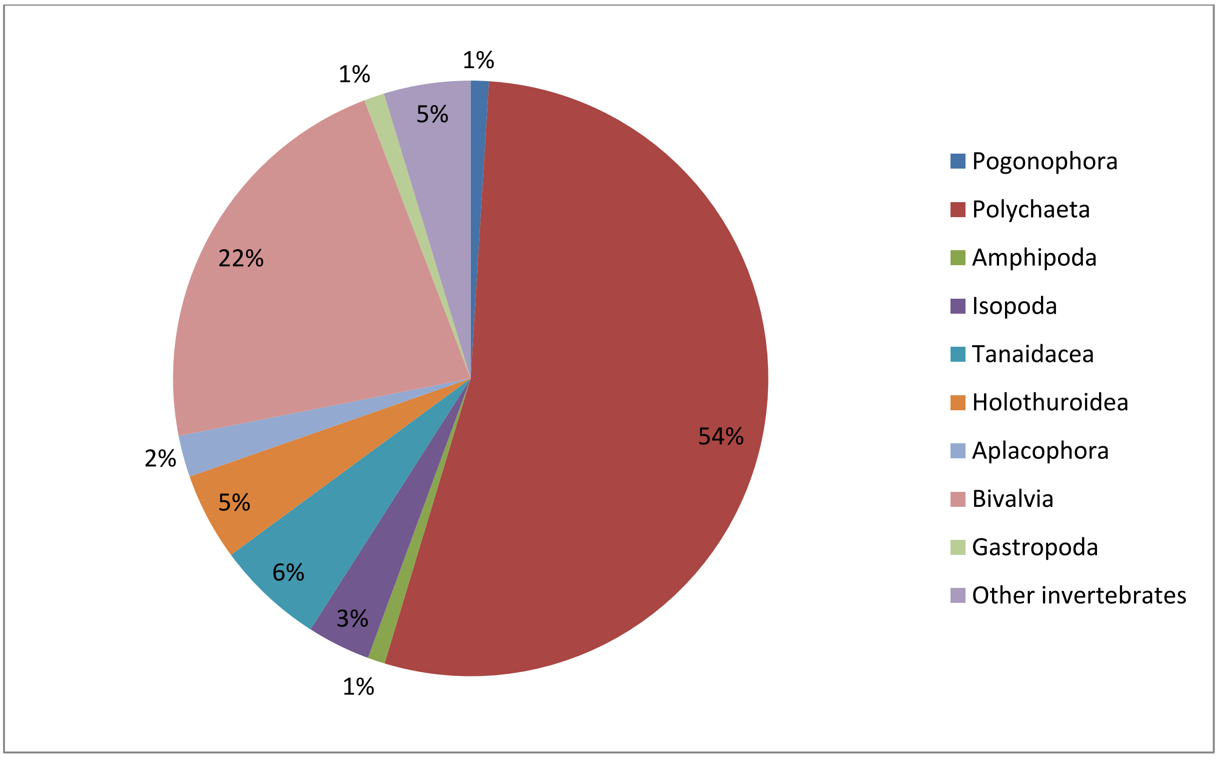

Fig. 57: Percentage of macrobenthic taxa (without Nematoda) of the box-corer samples.

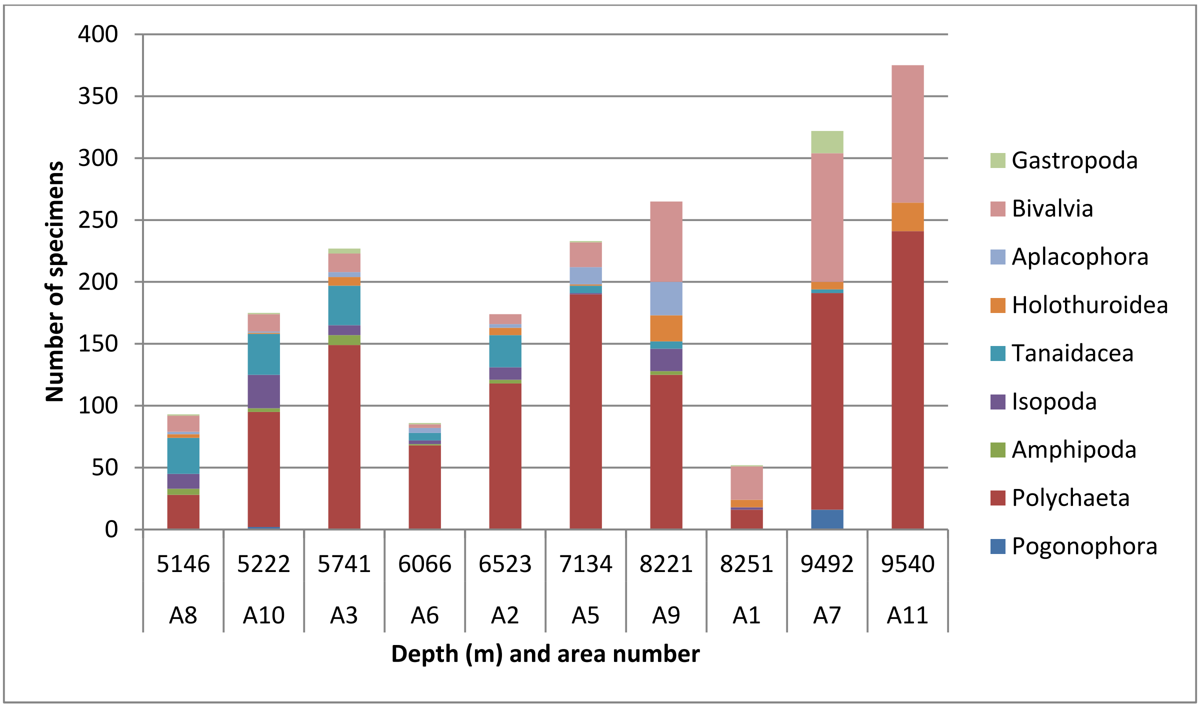

Fig. 58: Abundance and percentage of the dominant macrobenthic taxa (without Nematoda) found at the different depths and areas.

In general, species richness in our samples decreased with depths (Figure 7). The most «shallow» stations at the abyssal depths revealed the biggest number of taxa, while the bottom of the Kuril-Kamchatka Trench had the poorest fauna. However, low diversity of taxa was also reported from 6066 m, where the sediment was very soft and the surface layer of the sample was slightly disturbed.

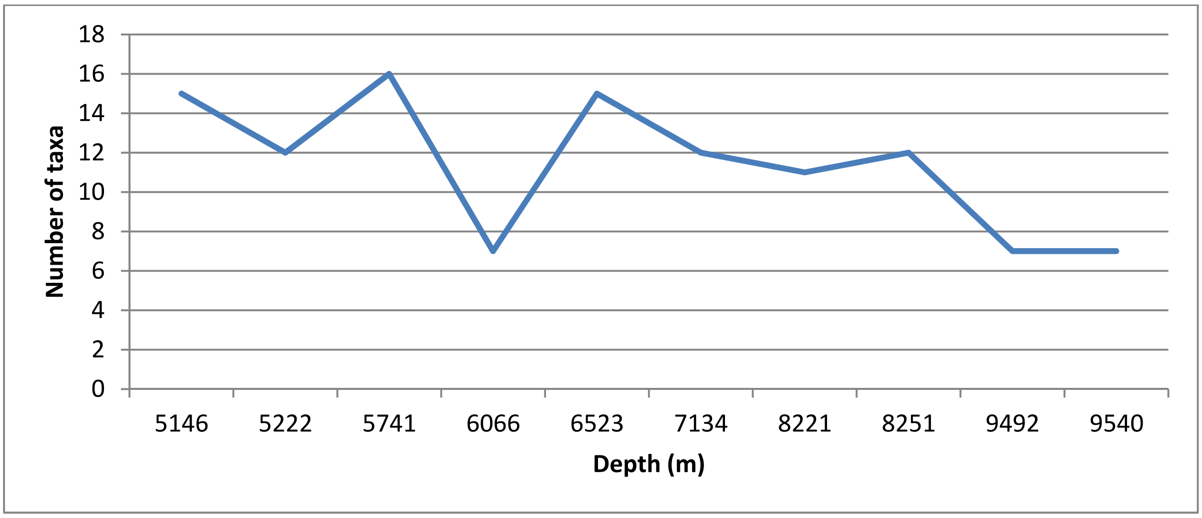

Fig. 59: Number of the macrobenthic taxa found at the different depths.

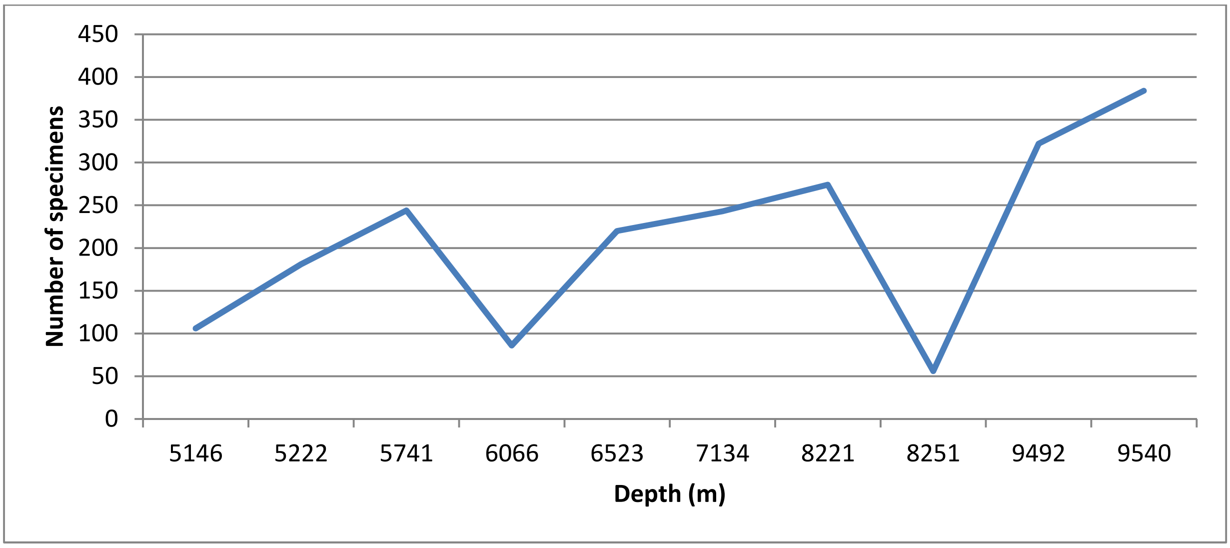

Fig. 60: Number of specimens of macrobenthic taxa found at the different depths.

Total number of marcobenthic animals in the BC samples was ranging from 56 (St. 14, A1, 8251 m) to 384 (St. 105, A11, 9540 m) and significantly increased with depth (Figure 8). At the bottom of the trench the highest abundance of macrobenthic animals was revealed (up to 384 specimens per sample). Polychaetes, bivalves and holothurians were the most abundant at these depths.

7.18.4. Conclusion

During KuramBio II expedition a total number of seven box corer samples were taken at hadal depths (more than 6000 m) of the Kuril-Kamchatka Trench. Two of these samples were taken at depths more than 9000 m. The maximal depth of the boxcorer sample of the KuramBio II expedition was 9540 m, while the maximal depth of the Kuril-Kamchatka Trench is 9717 m (Belyaev, 1989). This was the deepest successful boxcorer sample in the Kuril-Kamchatka Trench. Only five box corer samples were previously taken in this trench during the 1949-1966 years of RV “Vityaz” expeditions with maximal depth of the sample 8355 m (Belyaev, 1989; Filatova, 1971).

At the slopes and at the bottom of the Kuril- Kamchatka Trench very rich fauna comprising 30 taxonomic groups was observed. Taxonomic diversity depends significantly on sediment characteristics at the sampling site. The upper part of the trench slope with very dense sediment and active hydrodynamic has the most diverse fauna. The bottom of the trench (deeper than 9000 m) with very soft sediment is characterized by lowest diversity of fauna. However, the abundance of animals at these depths is significantly higher (more than 1358 specimens per sample). Polychaetes, bivalves and holothurians are the predominant groups at the bottom of the trench comprising more than 90% from the total number of animals.

Results from the box corer sampling at the hadal depths in the Kuril-Kamchatka Trench show that the abundance of benthic animals at maximal depths is 15 times more than what was shown before. For example, in the deepest sample collected by RV “Vityaz” in the Kuril-Kamchatka Trench (8355 m), only 84 specimens of animals were found (Filatova, 1971).

7.19. Macrofaunal Crustacea collected by means of epibenthic sledges

A. Brandt, S. Brix, N. Brenke, M. Blazewicz, O. Golovan, N. Heitland, A. Jazdzewska, K. Jeskulke, G. Kamenev, A. Lavrenteva, M. Malyutina, T. Riehl

7.19.1. Objectives

Macrofauna is the size fraction between about 1 mm to 1-several cm. It can be collected by means of the epibenthic sledge, but also the giant box corer or the Agassiz trawl. The epibenthic sledge samples, however, yield macrofauna in high abundances and usually well preserved. The general composition of the macrofauna collected with this gear is included in chapter 7.3.6. During our previous joint expeditions (SoJaBio, KurmBio I and SokhoBio this gear was successfully deployed at all bathyal and abyssal stations (Brandt et al., 2013; Brandt et al., 2015; Brandt et al, pers. comm). During all expeditions, Crustacea were most abundant besides Polychaeta. We now aimed to deploy this gear also at hadal depths during KuramBio II and to describe the faunal composition of the hadal stations.

7.19.2. Work at sea

The epibenthic sledge was successfully deployed 17 times during the SO250 expedition between roughly 4900 and 9500 m depth. On deck the complete samples will be immediately transferred into pre-cooled 96% ethanol and kept at least for 48 h in -20°C for DNA studies or into formaline (4%), the second deployment per station.

7.19.3. Preliminary results

Within the crustaceans the brooding Peracarida occurred most frequently in the samples (Fig. 61) besides calanoid copepods. Within the peracarids, isopods occur most frequently, followed by amphipods. The general composition of the Peracarida is therefore described in more detail in the following chapter.

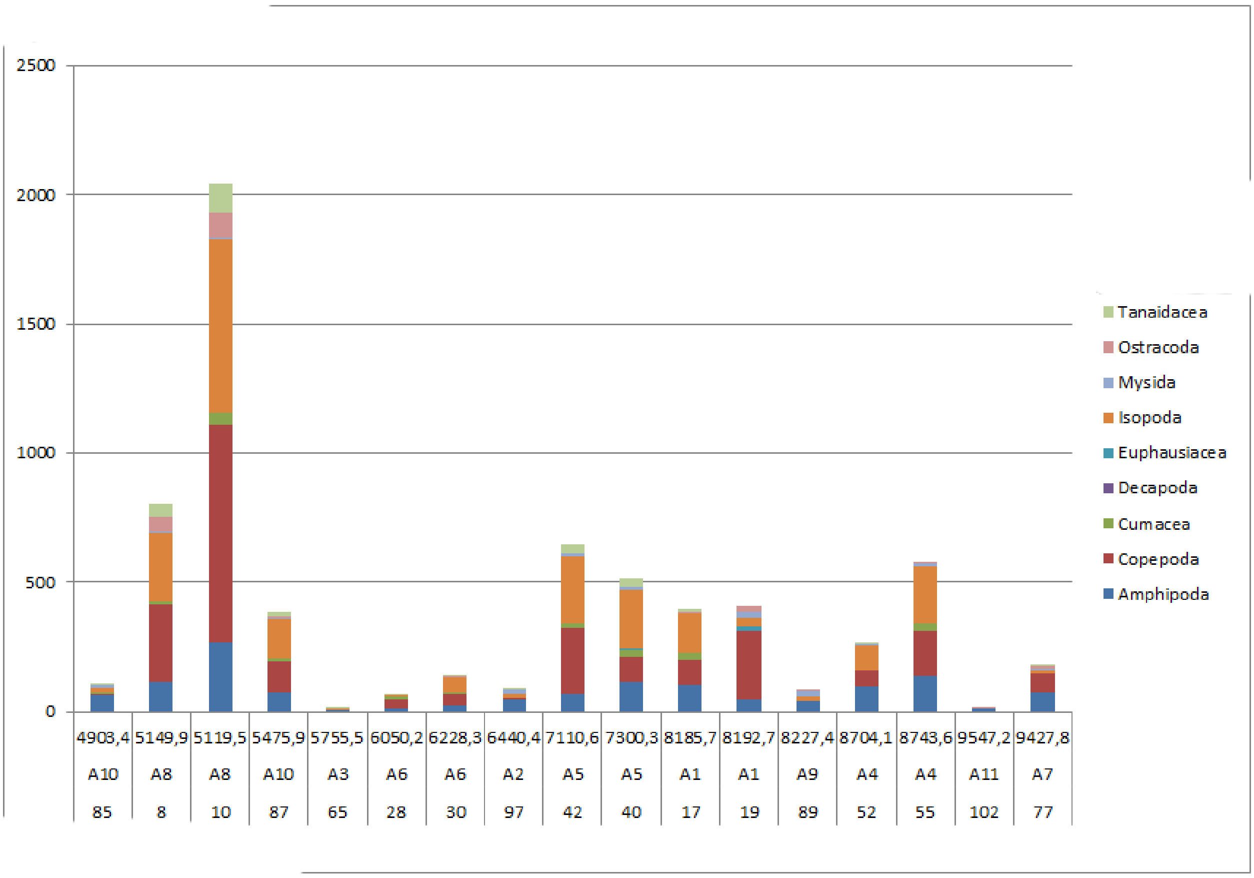

Fig. 61: Composition of Crustacean taxa in the epibenthic sledge catches.

7.20. Peracarid crustaceans retrieved from the epibenthic sledge catches

S. Brix, A. Brandt, M. Blazewicz, O. Golovan, N. Heitland, A. Jazdzewska, K. Jeskulke, A. Lavrenteva, M. Malyutina, T. Riehl

1.1.1.4. Objectives

Peracarid crustaceans belong to the dominant taxa of deep-sea areas worldwide. We therefore aimed to analyze the taxon composition and describe selected peracarid taxa (Amhipoda, Cumacea, Isopoda and Tanaidacea) in the following chapters.

1.1.1.5. Work at sea

The peracarid crustaceans analyzed on board were abundantly sampled by means of the epibenthic sledge which is described above. The material has been partly sorted on board.

1.1.1.6. Preliminary results

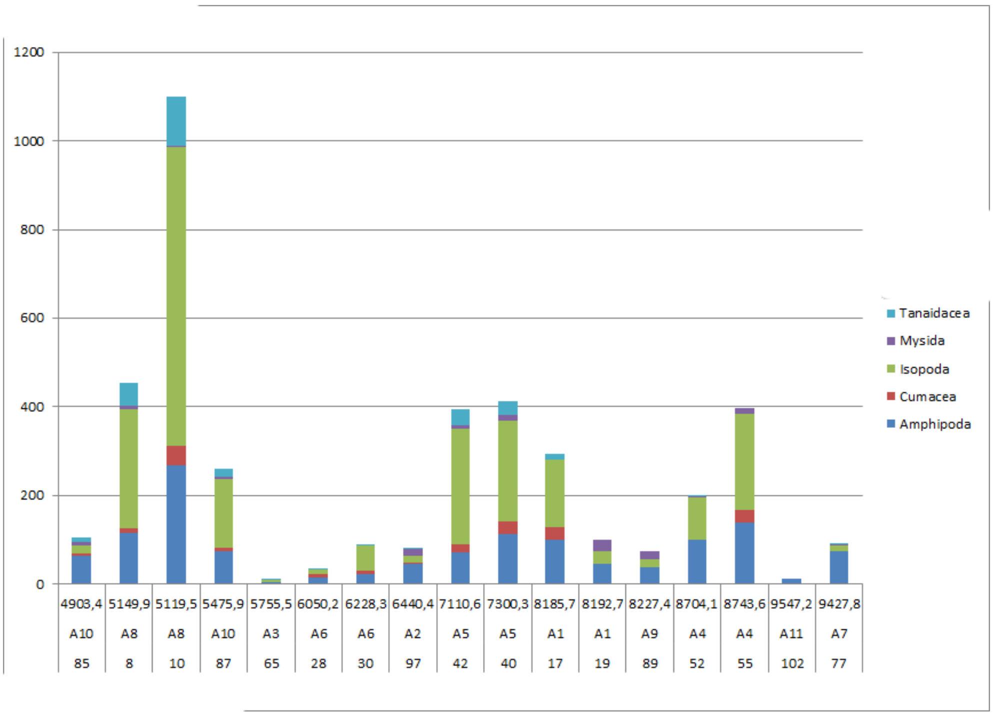

Fig. 62: Peracarid distribution ordered by depth.

Isopoda are the dominant taxon at all stations. The stations around 5000m depth were more specimen rich than the stations at greater depth. Especially the deepest stations around 9500m depth contained less Isopoda than Amphipoda. Ampipods were found at all stations.

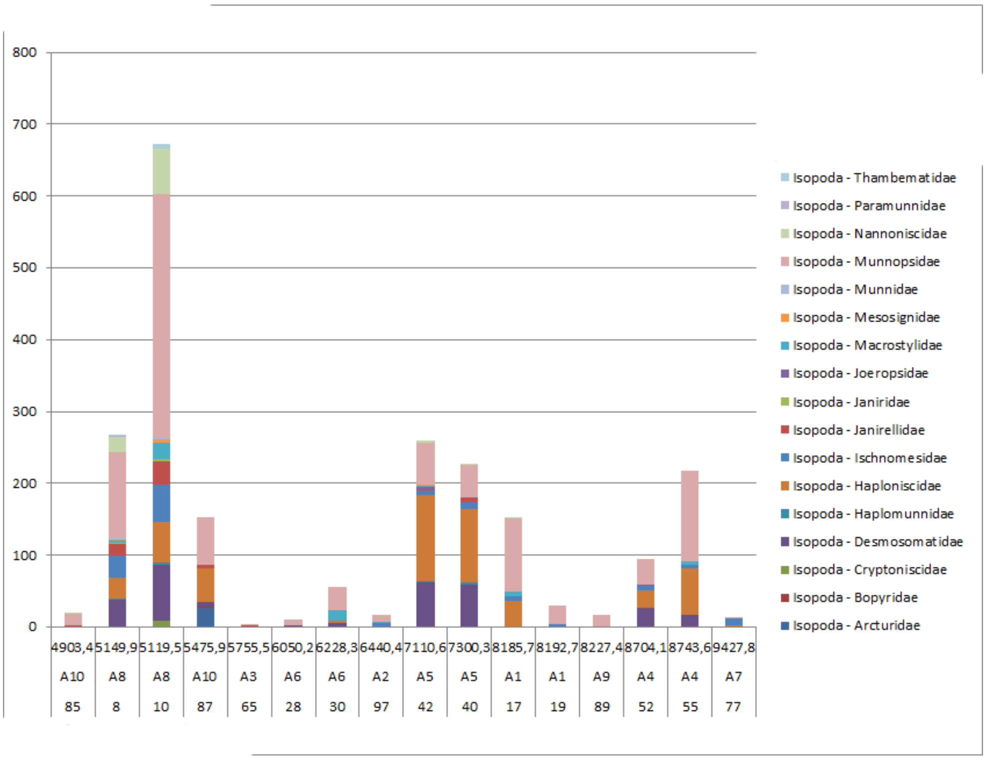

Fig. 63: Isopod family distribution at KuramBIO II EBS stations ordered by depth.

The swimming family Munnopsidae occurred at all stations. Haploniscidae were the second most abundant taxon. Desmosomatidae occurred at area 8, 10, 5 and 4 with more than 20 individuals, while at the other areas they were present with only few individuals. Nannoniscidae were found with higher numbers in areas 8 and 19, with few individuals in area 5 and 1, but were absent from the stations deeper than 8700m. Macrostylidae occurred at area 8, 10, 5 and 1. They were found in higher number in the areas of 5000m depth (8 and 10 with a total of 85 specimens). Arcturidae were found at station 87 (area 10) only. Parasitic isopods from epicaridean superfamilies Bopyroidea and Cryptoniscoidea were found as singletons or doubletons at areas 2, 3, 4, 6, 8, 10. Interestingly the arcturids occurred in high numbers in both trawled gear (e.g. EBS: 27) and were also found in BC samples. Ischnomesidae were found at all stations in all depths. Haplomunnidae occurs only at areas 8 and 10 with few individuals. As preliminary result, we may conclude that isopod diversity decreases with depth in the Kural-Kamchatka trench.

Desmosmatidae (286 specimens) and Nannoniscidae (137 specimens) were determined on genus level and voucher specimens were defined for DNA extraction on bord. A total number of 192 out of 423 specimens were successfully amplified on bord (PCR) for two markers (COI and 18S). The specimen selection comprises of several described species (e.g. *Austroniscus* cf. *karamani* Birstein 1970, *Panetela* cf. *tenella* Birstein 1963 or *Mirabilicoxa* cf. *richardsoni* Mezhov 1986 as well as numerous species new to science awaiting description in the home laboratories.

After each deployement of the EBS, peracarid crustaceans were picked alive for a genomics and biochemistry approach.

Fig. 64: isopod specimens picked “alive” and frozen for genomics and biochemisty (stations ordered by depth). The colours highlight different feeding types and life modes (orange: Munnopsidae – A swimmers, violet: Ischnomesidae – B walking, dark blue: Arcturidae – C filder feeders, occurring in colonies, light blue: Janirellidae – D walking).

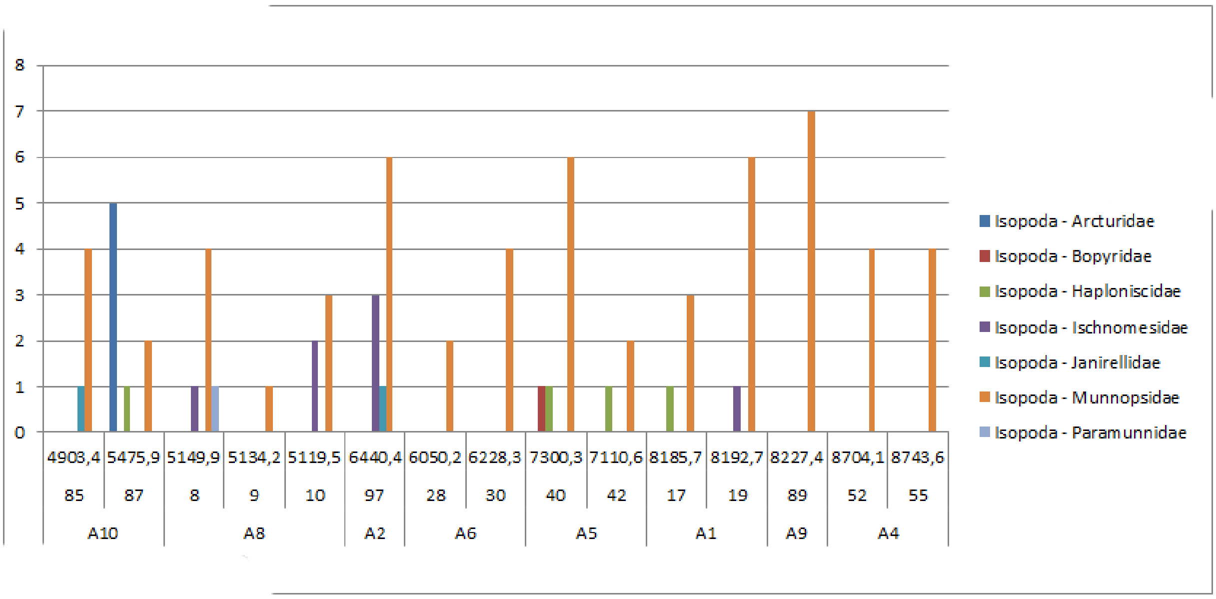

Fig. 65: Isopod families sorted on board during KuramBio II.

The intention of our approach is to use these specimens for an isopod phylogeny and to compare their position in the food web by applying biochemistry methods.

7.21. Analysis of the distribution and connectivity of Isopoda across the KKT using molecular methods

T. Riehl, N. Heitland, A. Brandt

7.21.1. Objectives

"The formation of species has long represented one of the most central, yet also one of the most elusive, subjects in evolutionary biology" (Palumbi 1994). Identification of factors that promote lineage divergence will improve our understanding of deep-sea biodiversity (Glazier & Etter 2014) and therefore is of major interest in marine biology. Geographic isolation may be one of those factors promoting speciation in the deep sea (Faure *et al.* 2009) even though absolute isolation is not necessarily required. Reduction of gene flow, thus the discontinuity of genetic exchange within species, may already be sufficient to allow marginal populations to diverge from the common gene pool (Palumbi 1994). Obstacles to distribution, such as ridges (Wilson & Hessler 1987) separating abyssal settings, have been discussed as promoters for allopatry assuming limited dispersal abilities across depth and distance. Given that some taxa are predominantly leading a benthic lifestyle, trenches should represent another dispersal barrier because they also interrupt abyssal benthic continuity. Although physiological tolerances are almost unstudied for abyssal and even more so for hadal fauna, pressure-related factors should be responsible for depth restrictions in species distribution. Specialization for certain depth regimes has been reported, for instance for amphipods (France and Kocher, 1996; Havermans et al., 2013) and assumed for certain isopods (Wilson 1983; Held & Wägele 2005).

Such a setting is found in the NW Pacific Ocean where the Kuril Kamchatka Trench (KKT) is formed by the Pacific plate subducing under the Okhotsk Plate. The KKT is roughly stretching out in a southwest-northeast direction parallel to the volcanic Kuril Islands and it separates the abyssal seafloor of the NW Pacific Basin from the Kuril slope and beyond the Kuril Basin in the

Sea of Okhotsk. The area around the KKT is among the best studied areas in the world in terms of known benthic fauna thanks to several expeditions of the Russian R/V Vityaz in this area.

The investigations of the Russian R/V Vityaz in the mid-twentieth century made the NW Pacific region around the KKT one of the best-studied deep-sea areas in the world. It is one of the most highly productive and rich areas of the World Ocean and inhabited by rich fauna with an incomparable set of benthic species already described based on the Vityaz campaigns, amongst them many isopod crustaceans (Birstein 1961, 1963, 1970). Additionally, the knowledge of the diversity in the KKT and adjacent NW Pacific Abyssal Basin was drastically expanded by the German-Russian KuramBio project (Brandt *et al.* 2012; Brandt & Malyutina 2015; Elsner *et al.* 2015; Malyutina & Brandt 2015) that targeted the smaller size fractions of organisms at abyssal depths using an epibenthic sledge (EBS) (Brenke 2005; Brandt *et al.* 2012).

Isopod crustaceans are amongst the better-studied and most diverse as well as abundant groups of deep-sea macrofauna, especially at abyssal and hadal depths (Hessler & Sanders 1967; Gage 2004; Brandt *et al.* 2007, 2015). Due to their brooding mode of reproduction, a limited dispersal ability, when compared to organisms with free-swimming larvae has often been assumed. This taxon may hence represent a well-suited model for the inference of spatial differentiation.

Amongst Isopoda, the families Haploniscidae Hansen, 1916 and Macrostylidae Hansen, 1916 (Isopoda: Janiroidea) are frequently encountered on abyssal sediments. Macrostylidae is considered a specialized endobenthic component of the deep-sea macrofauna (Thistle & Wilson 1987, 1996; Hessler & Strömberg 1989; Wägele 1989; Riehl 2014). Knowledge about their general biology is scarce. One single behavioral observation has ever been recorded and published (Hessler & Strömberg 1989). These observations together with strongly derived morphological apomorphies, which are likely adaptations for a digging or tubicole lifestyle (Wägele 1989), lead to the generally accepted hypothesis, that this taxon is strictly epi- and endobenthic. No morphological features can be related to a natatory capability.

It is a monotypic family with currently 85 described species worldwide (Riehl & Brandt 2010, 2013; Riehl 2014). Macrostylids are considered a derived sister group to the Urstylidae (Riehl et al., 2014) and are characterized by multiple derived character states, such as the fusion of pereonites 1–3, the presence of statocysts inside the pleotelson (Bober *et al.* in progress; Bober 2014), and pronounced sexual dimorphisms (Heitland *et al.*; Riehl *et al.* 2012; Heitland 2015). Although cosmopolitan and a common fraction of deep-sea samples (Menzies 1962; Birstein 1970; Svavarsson 1987; Brandt *et al.* 2004; Ellingsen *et al.* 2007; Wilson 2008; Elsner *et al.* 2015), the family is comparatively not well studied and a systematic revision is to date lacking.

From relatively shallow waters of cold boreal, Arctic, Antarctic and austral waters (Sars 1864, 1899; Hansen 1916; Brandt 1992; Riehl & Kaiser 2012) to greatest hadal depth, macrostylids have been discovered (Birstein 1970; Menzies & George 1972; Mezhov 1989, 2004; Devey 2015) and their depth distribution is thus among the widest recorded covering all depths from sublittoral through to the bottom of the Challenger Deep of the Mariana Trench.

The same applies to the family Haploniscidae, which comprises 140 described species from eight genera (Wilson & Schotte 2008) with a worldwide distribution (Brökeland 2005). Their general appearance resembles terrestrial oniscidean isopods with an oval body shape and expanded lateral margings of the pereonites (Hansen 1916). The anterior four pereonites are free while the posterior three pereonites can be dorsally fused to a varying extend. The seventh pereonite is always fused with the pleotelson, except for one species *Abyssoniscus ovalis*

Birstein, 1971. They are characterized by a conserved morphology with low interspecific variability (Brökeland 2005), which could impede species delineation based on morphological characters. Therefore, genetic studies on this family are supposed to reveal new insights in the differentiation of species and maybe also cryptic speciation processes, which have not been studied for Haploniscidae so far. Until to date nothing is reported about their behavior and benthic lifestyle, but as all thoracic limbs are walking legs (Hansen, 1916) and as some species from different genera can enroll their body into a ball (Brökeland 2005) an epibenthic lifestyle is supposed. Same as for Macrostylidae no morphological adaptations to a natatory lifestyle can be recognized.

The area around the Kuril-Kamchatka Trench is among the best studied areas in the world in terms of known and described macrostylid and haploniscid species. Altogether, ten species of *Macrostylis* Sars, 1864 have been described (Riehl 2012, Table 1) following the expeditions with R/V Vitjaz in 1949 and 1953-1957 (Birstein 1963, 1970). Five of these were previously known from depths deepther than 6000 m (hadal). Six of these have been collected again during KuramBio and the total number of species recorded during the latter campaign could be raised to 18 (Elsner *et al.* 2015). Three of these additional, new species are in the process of description (Bober *et al.* in progress; Bober 2014).

For the current project, we aim for a combination of morphological taxonomic and molecular genetic approaches to investigate the diversity, biogeography, and population connectivity of selected common representatives of deep-sea Isopoda. Material from KuramBio (SO223) and KuramBio II will be compared and analyzed together. Genetic diversity on the population, species and family level will be studied across spatial scales (locally, between sites, across-KKT, across depth). The fundamental research questions are as follows:

Can species maintain gene flow across the KKT?

Are there truly eurybathic species that extend their distribution between abyssal and hadal depths?

Are there depth-endemic species occurring only at abyssal or hadal sites?

7.21.2. Work at sea

Specimens used were collected with all types of benthic gear used (Table 21). During this cruise, specimens were constantly kept on ice or under cool conditions (-20°C freezer to avoid degeneration of DNA. Preliminarily identification to phenotypic morpho-clusters (Hausdorf 2011) was performed using the available literature and a stereo microscope (Leica MZ7.5) and separated individually. In order to investigate connectivity/isolation in terms of genetic differentiation, widely distributed species have to be selected. Consequently, isopod crustaceans belonging to the common families Macrostylidae and Haploniscidae (plus additional selected individuals) were chosen for tissue dissection when they occurred on several working areas, preferably across the KKT. For the family Macrostylidae, all further specimens were selected additionally, in order to obtain genetic information to be used in a phylogenetic analysis of the family.

Then, voucher images were taken from each of these specimens using a macro-photo setup before dissection. A Canon EOS 600D was employed with a Canon MP-E macro lens with 5x magnification. A MT–24EX macro flash and additional SPEEDLITE 430EX slave flashes were used to illuminate the objects from laterally in order to create a black background. The camera was mounted on a stand with manual precision focusing drive. To avoid unnecessary vibration, the Canon software EOS Utility was used to trigger the camera shutter from a laptop and to directly store images on the computer hard drive. In order to avoid DNA degradation, methods described by Riehl et al. (2014) were followed with modifications.

From each individual, one to three posterior pereopods were dissected, preferably from one side only so that morphological information remains available. Legs were transferred from 96% Ethanol to lysis buffer using sterilized probes fitted with tungsten needles or entomological minutia needles. Sterilization was achieved using a Micro steril © heater with glass beads by exposing the needles to heat for at least 30 seconds. A list of samples taken is given in Table 21.

7.21.3. Preliminary results and interpretations

Table 21: The distribution of all species of Macrostylidae and selected Haploniscidae during KuramBio II.

Species\Station	6	8	10	14	17	20	29	30	40	42	52	54	55	63	74	88	90	85	86	Sum	Rel.	Occurrence
Area	A8	A8	A8	A1	A1	A1	A6	A6	A5	A5	A4	A4	A4	A3	A9	A9	A9	A10	A10		Abundance	# stations
Gear	BC	EBS	EBS	BC	EBS	AGT	AGT	EBS	EBS	EBS	EBS	AGT	EBS	MUC	MUC	MUC	AGT	EBS	AGT			
Macrostylis curticornis	0	1	10	2	2	0	1	12	0	0	0	1	8	1	2	0	31	1	0	72	17.0	12
Macrostylis grandis	0	1	3	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	6	1.4	3
Macrostylis cf."sabinae" n. sp.	0	3	13	0	3	0	0	1	0	0	0	0	0	0	0	0	1	0	2	23	5.4	6
Macrostylis "barnacki"	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	3	0.7	2
Macrostylis profundissima	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0.2	1
Macrostylis sp. 1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0.2	1
Macrostylis sp. 2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0.2	1
Macrostylis sp. 3	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	2	0.5	1
Macrostylis sp. 4 "mini"	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0.5	1
Macrostylis cf. zenkevichi	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8	8	1.9	1
Haploniscus cf. hydroniscoides	1	6	23	0	26	0	0	0	74	49	33	0	38	0	0	0	0	0	0	250		8
Haploniscus sp. 3	1	12	19	0	0	1	0	3	15	3	0	0	0	0	0	0	0	0	0	54		7
Total # Macrostylidae ind.	2	23	72	2	32	1	1	18	89	54	33	1	46	1	2	1	32	1	12	423		19
% Macrostylidae ind.	0.5	5.4	17.0	0.5	7.6	0.2	0.2	4.3	21.0	12.8	7.8	0.2	10.9	0.2	0.5	0.2	7.6	0.2	2.8	100		
Total # Macrostylidae sp.	0	3	5	1	3	0	1	3	0	1	0	1	1	1	1	1	2	1	4	29		
Total # Haploniscidae ind.	2	18	42	0	26	1	0	3	89	52	33	0	38	0	0	0	0	0	0	304		10

Preliminary identifications based on morphological phenotypic clusters resulted in delimitation of nine species of Macrostylidae of which five had been previously described (*Macrostylis curticornis*, *M. grandis, M. ovata*, *M. profundissima*, and *M. zenkevichi*). Two other, undescribed species collected during KuramBio and currently in the process of description, the species complex *Macrostylis* n. sp. "sabinae/amaliae" and *M.* n. sp. "barnacki" were also amongst the samples from KuramBio II. The other species that could not be allocated to any described species were rare or even occurred in the samples as singletons.

In general, macrostylids have been collected with all benthic gears (BC, MUC, EBS, and AGT). While MUC and BC samples comprised maximally 1–2 specimens, the trawled EBS and AGT were the main instruments to collect this family, also indicating low densities in their natural environment. The occurrence of macrostylids was also very uneven across EBS and AGT samples with more than 50 % of all macrostylids collected at only two stations (EBS SO250-10 and AGT SO250-90). This has to be interpreted with care still, as the sorting process has not yet come to an end.

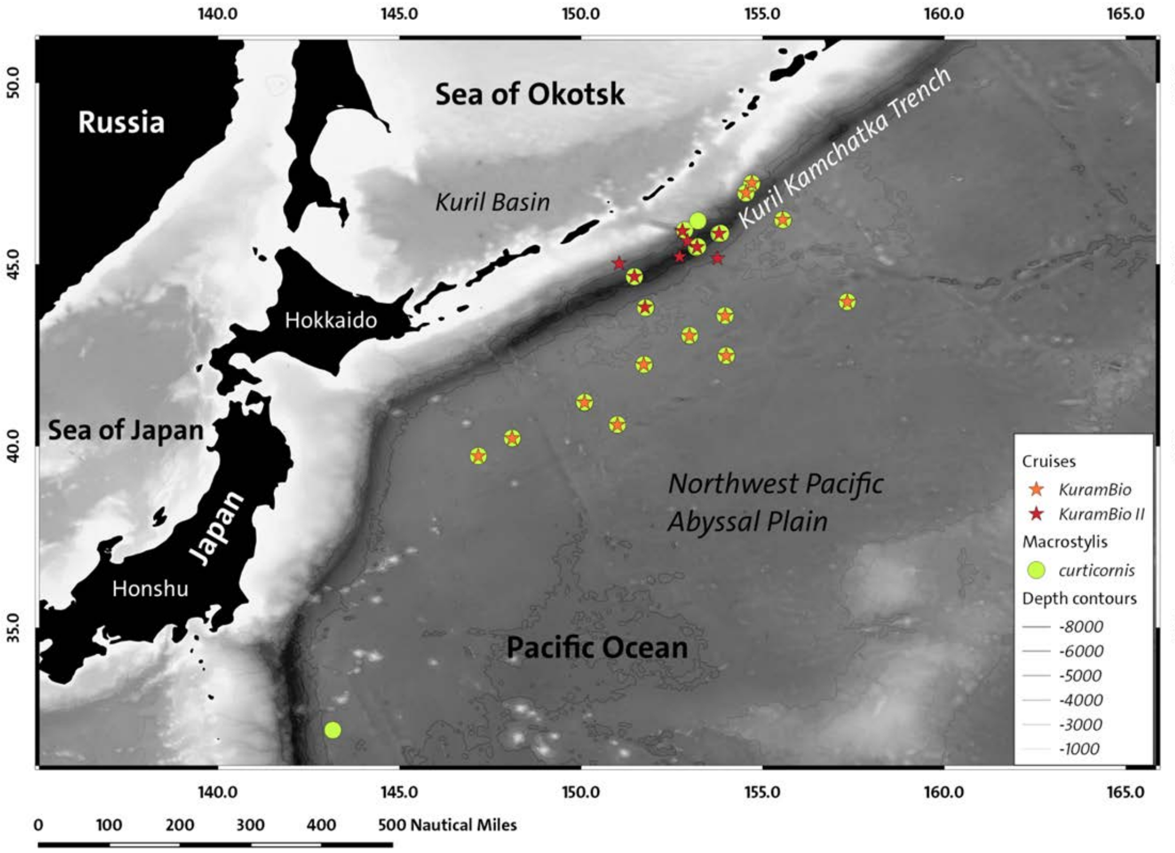

Figure 66: The records of *Macrostylis curticornis* Birstein, 1963 (Isopoda: Janiroidea) from the expeditions of RV Vityaz (occurrence point without star) and R/V Sonne. *M. curticornis* is one of the most widely distributed macrostylids in the NW Pacific and occurs on both sides of the Kuril Kamchatka Trench as well as in the hadal zone of the trench itself. © T. Riehl.

Most numerous amongst the macrostylids was *M. curticornis* (Fig. 66) which comprised ~60.5 % of all collected macrostylids. However, a distinctly bimodal size distribution of both adult females and males could be observed on board indicating another previously overlooked species. The second most abundant was the yet undescribed species complex *Macrostylis* n. sp. “sabinae/amaliae” (Fig. 67) making 19.3 % of the macrostylids but which is composed of at least two morphologically indistinguishable species (Bober *et al.* in progress). *M. curticornis* and this species complex had a wide occurrence having been found at twelve and six stations respectively that were collected at seven and five working areas respectively.

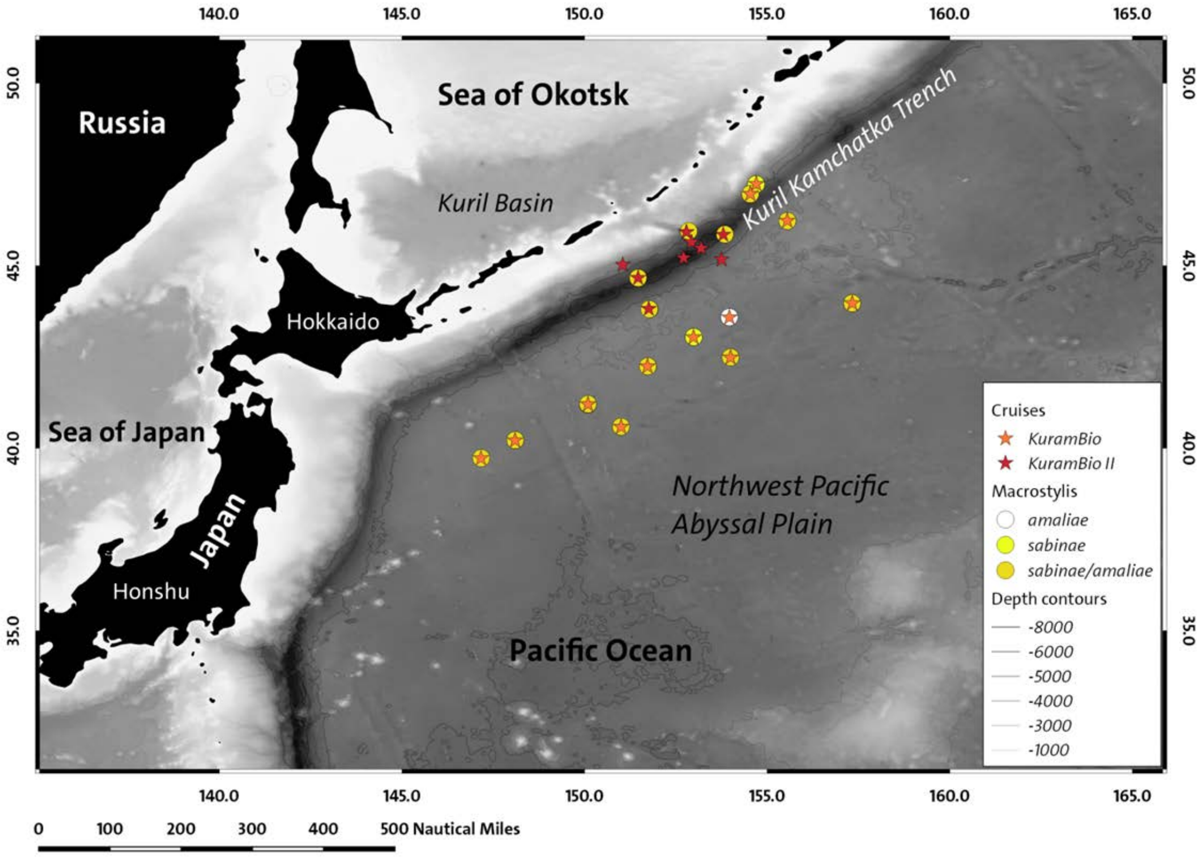

Figure 67: *Macrostylis* n. sp. "amaliae" and "sabinae" are in the process of being described taxonomically. Morphologically, these two species cannot be delimitated and hence, here, they could not be distinguished. However, this map shows the findings of these species from the KuramBio and KuramBio II expeditions and from KuramBio already DNA sequences are available for a subset of specimens that allows clear distinction. © T. Riehl.

Based on in total 24 specimens of third and fourth species collected during KuramBio (18) and KuramBio II (6), *M. grandis and M. ovata,* as described by Birstein (1970), could not be separated as distinct species anymore. The specimens provided insight into the ontogeny of the species suggesting that *M. ovata* may represent the manca and juvenile forms of *M. grandis*. The latter appeared first in the same publication as the second and hence, although more detailed proof from morphological and genetic data is still required, henceforward only *M. grandis* is referred to in the further course of this report. Specimens of *M grandis* have been collected at three stations in two areas.

These three species have in common that they occur on both sides of the trench at abyssal depth but also show relatively wide depth ranges that stretch deep into the hadal, taken their catches on this cruise in combination with KuramBio samples: *M. curticornis* was collected from 5150 m down to 8700 m, which is the deepest record for this species. *Macrostylis* n. sp. "sabinae/amaliae" was caught from 5150 m down to 8200 m, which is also a new depth record. *M. grandis* was sampled from 5150 m down to 6000 m, while it must be noted that it has been found also at deeper sites, at 7295 m, during the Vityaz cruises.

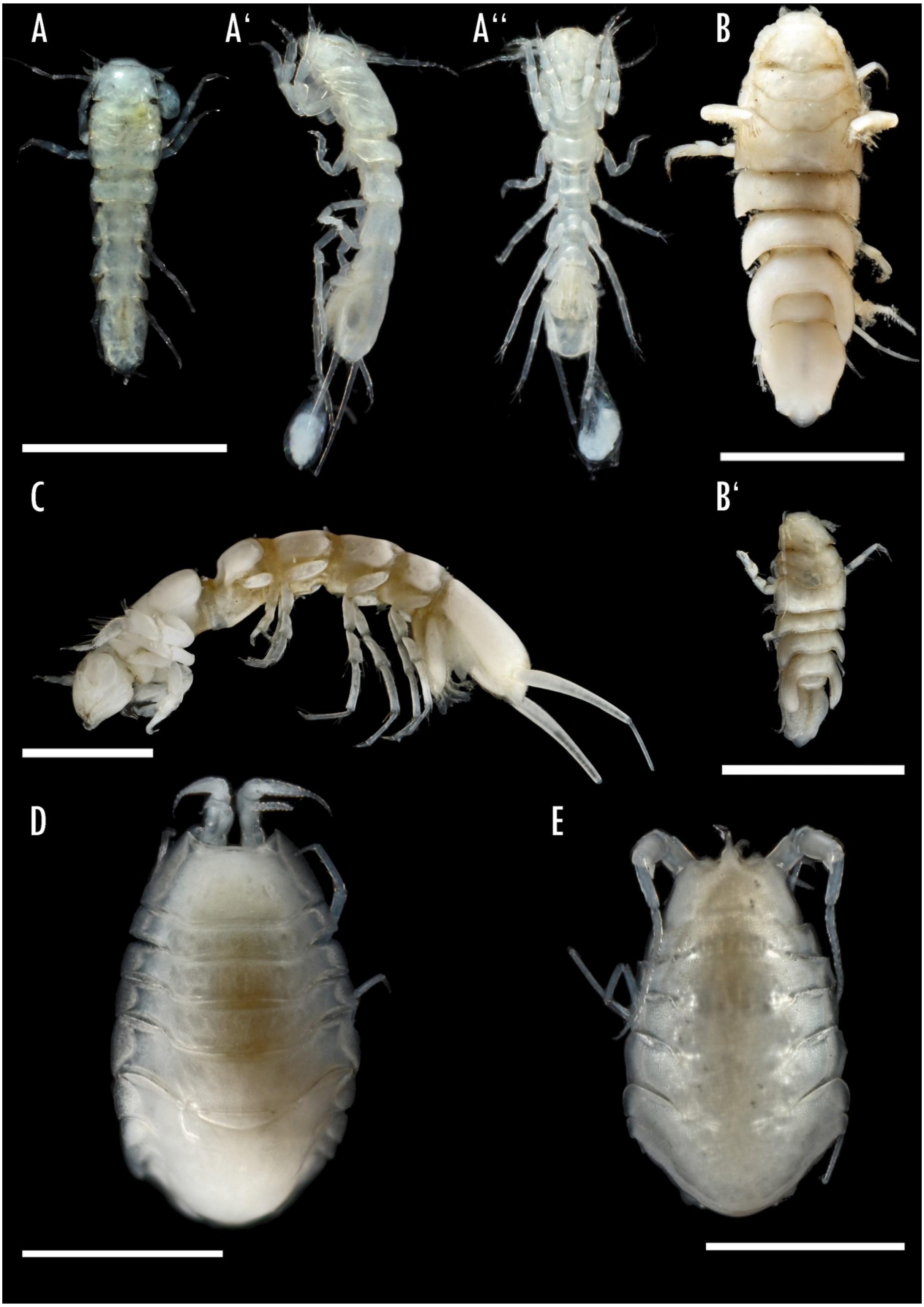

Figure 68: Species of Macrostylidae and Haploniscidae occurring across several stations of KuramBio II. A) *Macrostylis* n. sp. “sabinae” juvenile female with tantulocarid parasite. A’ an A ‘’) *M*. n. sp. “sabinae” adult male with tantulocarid parasite. B) *Macrostylis grandis* adult female. B’) *Macrostylis grandis* juvenile (probably = *M. ovata*). C) *Macrostylis curticornis*. D) *Haploniscus*

cf. *hydroniscoides*. E) *Haploniscus* n. sp. #3. Scales = 1 mm, except B and B' = 3 mm. © T. Riehl, N. Heitland.

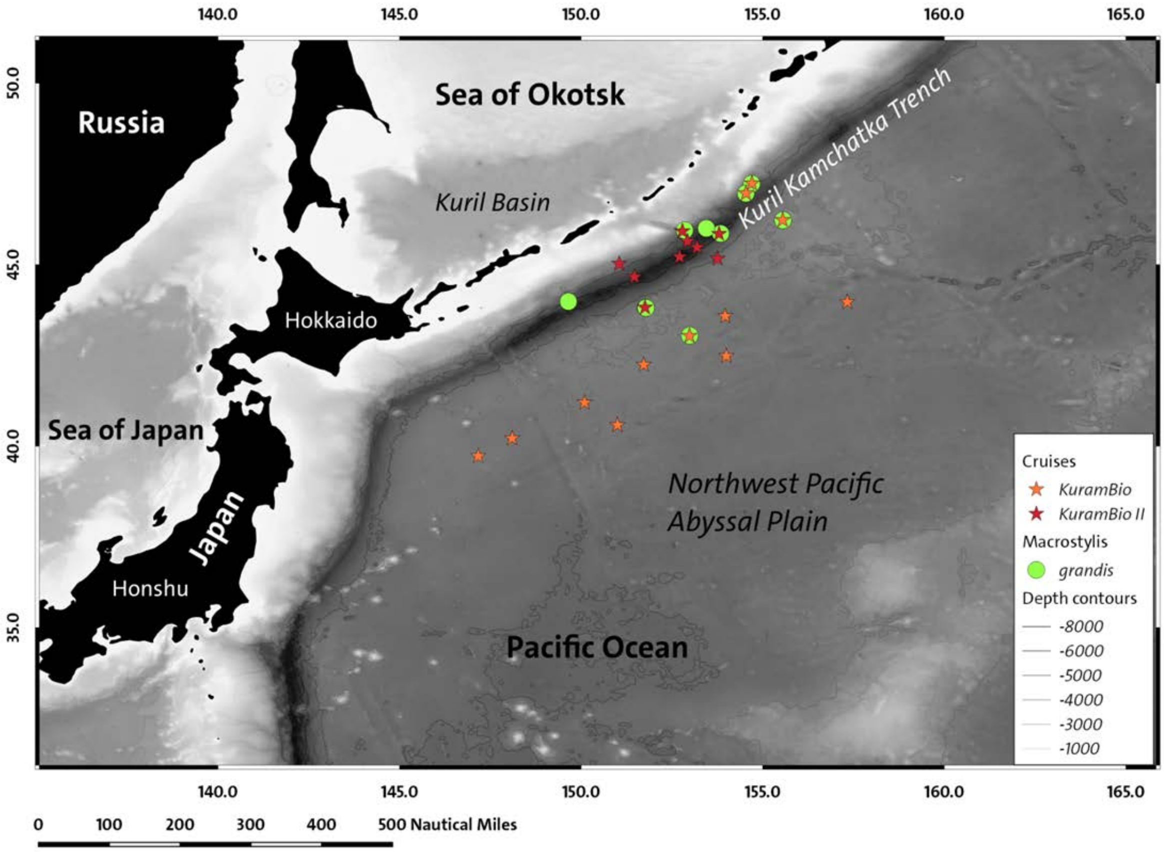

Figure 69: All known records of *Macrostylis grandis* from the Vityaz, KuramBio and KuramBio II cruises. © T. Riehl.

For the Kuril-Kamchatka area twelve species belonging to four genera have been described by Birstein (1963, 1971) after the expeditions of R/V Vitjaz. Four of them have also been sampled during the KuramBio expedition in 2012, besides seven other species, which were new to science. During KuramBio II we found at least 13 species of three genera, from which we chose the two most abundant, *Haploniscus* cf. *hydroniscoides* and *Haploniscus* n. sp. #3, for further analysis of genetic connectivity and distribution across the KKT. The genus *Haploniscus* comprises the largest number of species within the eight genera of Haploniscidae. It is not monophyletic and includes more than 70 species which could not be allocated to the other well-defined genera (Brökeland 2010). *H*. cf. *hydroniscoides* occurred on both sides of the trench and even at hadal depth and was the dominant species in most of the stations. *Haploniscus* sp. #3 was also found on both sides of the trench but its abundance decreased with depth and it was not found at the deepest stations in the middle of the trench.

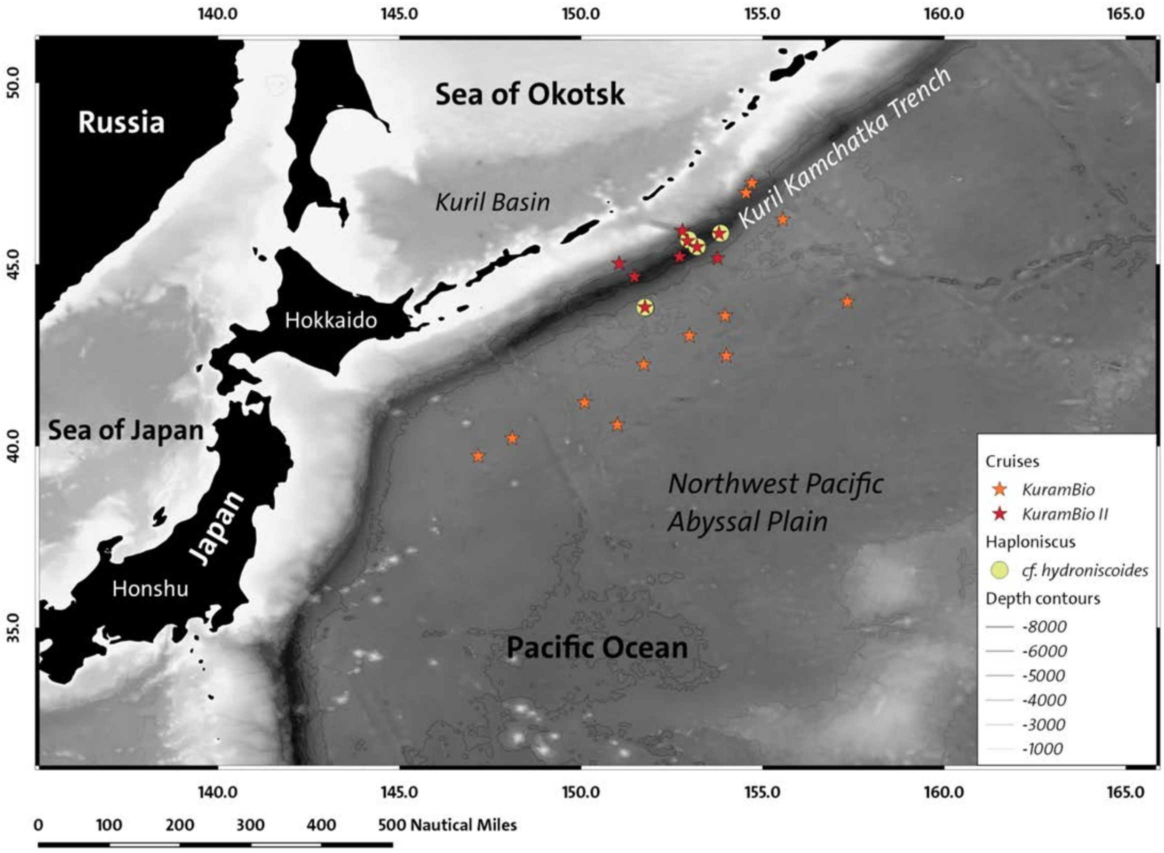

Figure 70: Distribution of *Haploniscus* cf. *hydroniscoides* in the KuramBio II samples. © T. Riehl.

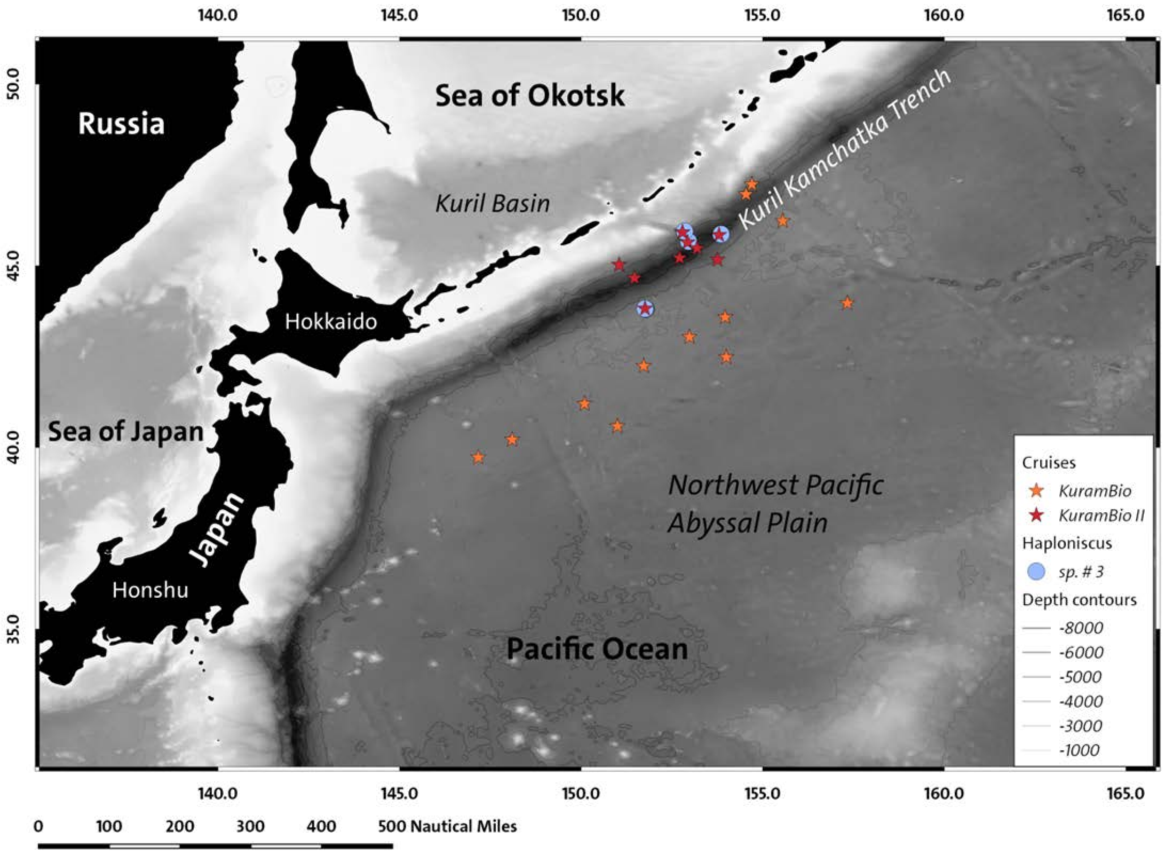

Figure 71: Distribution of *Haploniscus* n. sp. #3 in the KuramBio II samples. © T. Riehl

7.21.4. Future targets

The tissue will be used for the extraction, amplification and sequencing of the commonly applied genetic markers cytochrome-c-oxidase subunit 1 (COI), the ribosomal rRNA large subunit (16S) (both mitochondrial) and the nuclear small subunit rRNA (18S). Genetic laboratory service will be provided by the company LGC Genomics Germany.

Additionally, the phylogenetic relationships of KKT inhabitants will be investigated in context of abyssal, bathyal and shelf species that are potentially related. This will help resolving the question of the origin and isolation of hadal communities.

Taxonomic descriptions of species that are new to science will be performed under consideration of both morphological and DNA data. By generating publicly available DNA Barcodes, we participate in the development of the global database BoLD (Ratnasingham & Hebert 2007) to support future identifications and biogeographic studies on deep-sea isopods.

The question of synonymy of *M. grandis* and *M. ovata* will be addressed by the same means in the framework of a B.Sc. thesis.

7.22. Composition of Munnopsidae

M. Malyutina

7.22.1. Objectives

Munnopsidae are one of the dominant isopod families in the deep sea. We therefore aimed at an inventory of this abundant and diverse family in the KKT.

7.22.2. Work at sea

During the expedition isopods of the family Munnopsidae have been collected at almost each station and at most stations and with all gear sampled.

7.22.3. Preliminary results

Munnopsidae is the most abundant and diverse isopod family with totally 1190 individuals. All specimens from samples sorted have been identified to genus or species levels. In total 42 species from 20 genera and 8 subfamilies have been identified so far. After the preliminary identification about a half of all species seem to be new to science. The most numerous and frequent is the subfamily Eurycopinae (380 individuals, 32% of all munnopsids) represented by 5 genera *Disconectes*, *Tytthocope, Munnicope* and *Microcope*, following by Betamorphinae with only one genus *Betamorpha* (279 ind., 23% of all) and Storthyngurinae (232 ind., 20%) with 3 genera: *Rectisura* (230 ind.), *Vanhoeffenura* (1) and *Storthyngura* (1). The most abundant and specious genera are Eurycopinae's genus *Eurycope* with 5 species (281 ind., 24% of all) and *Betamorpha* (279 ind., 23%). At the hadal stations diversity is lower than in the abyssal stations, but few species like *Rectisura vitjazi* (124 individuals at st. 43), *Eurycope* sp. (119), *Betamorpha acuticoxalis* (80), *Ilyarachna sp*. (89) occur in some hadal stations with rather high abundance. The richest area in terms of species richness and abundancy of Munnopsidae was the shallowest polygon A8 with two stations 8 and 10 at depths 5120 and 5150 m: more than 372 individuals at the station 10 with 17 species (both fractions of the EBS sample, supranet and epinet have been sorted onboard). At station 8 just a supranet sample was sorted so far and we picked 118 individuals, which belonged to 23 species. It is higher number of species than for munnopsids from both fractions of the EBS samples from the station 10. As the epinet of this catch was not sorted yet we can predict that this station will be the richest in term of richness and abundance of Munnopsidae. The hadal station 55 is the next rich station in term total number of munnopsids individuals (121 ind.) in both nets of EBS, but they represent only 3 abundunt species of the genera *Eurycope*, *Betamorpha*, and *Ilyarachna*. At the deepest station 77 with depth of 9582 m only one specimen of *Eurycope* sp. was collected. The number of collected species of Munnopsidae in all sampled areas and their diversity and abundance in the hadal depths of the KKT are all smaller than it was revealed for the abyssal area near the Kuril-Kamchatka Trench (depth range 4882- 5832 m) during the KuramBio expedition (100 species). Among 39 species of Asellota described by Birstein from KKT hadal depths >6000 m, 9 species belong to family Munnopsidae (Birstein, 1970, 1971; Kussakin, 2003). We collected at least 6 of these known, large sized species: *Rectisura vitjazi* (Birstein, 1957), *Rectisura herculea* (Birstein, 1957), *Rectisura distincta* (Birstein, 1957) *Vanhoeffenura chelata* (Birstein, 1957), *Munnicope magna* (Birstein, 1963), *Betamorpha acuticoxalis* (Birstein, 1963) and *Eurycope curtirostris* Birstein, 1963.

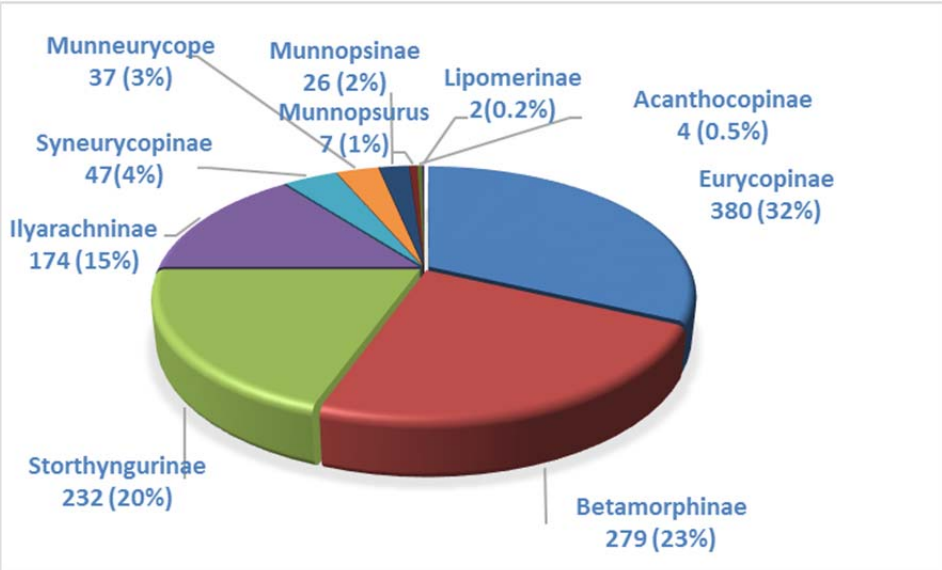

Fig. 72: Munnopsidae subfamily composition with numbers of individuals for each subfamily and % of all munnopsids individuals from the all samples processed on board.

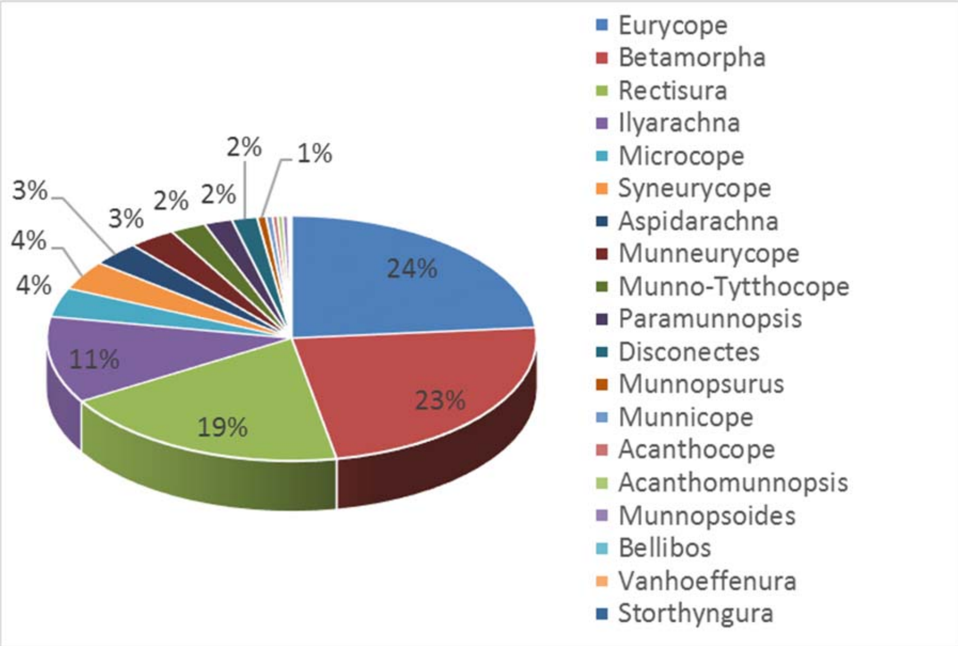

Fig. 73: Munnopsidae genus composition.

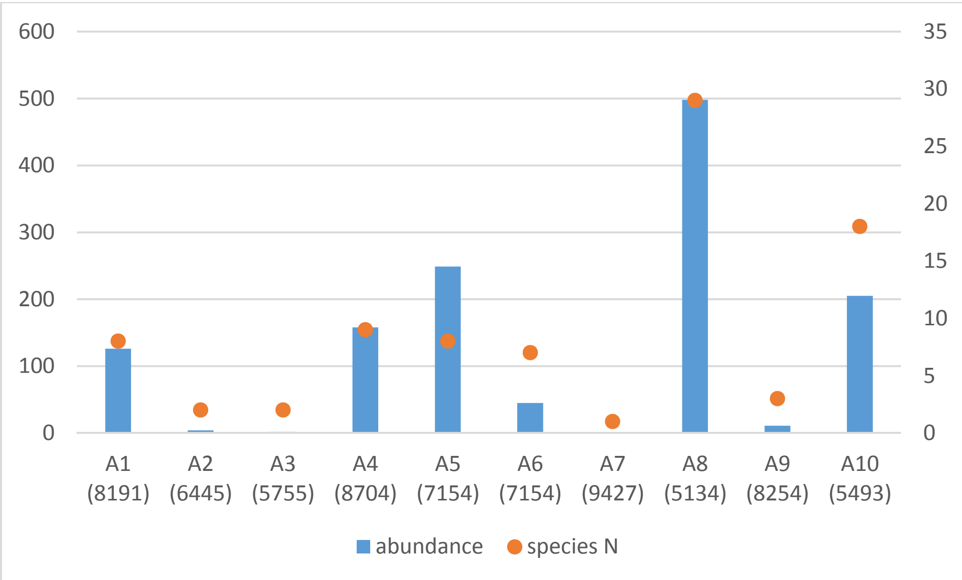

Fig. 74: Abundance and species richness of Munnopsidae on the sampling polygones, including data from all gears.

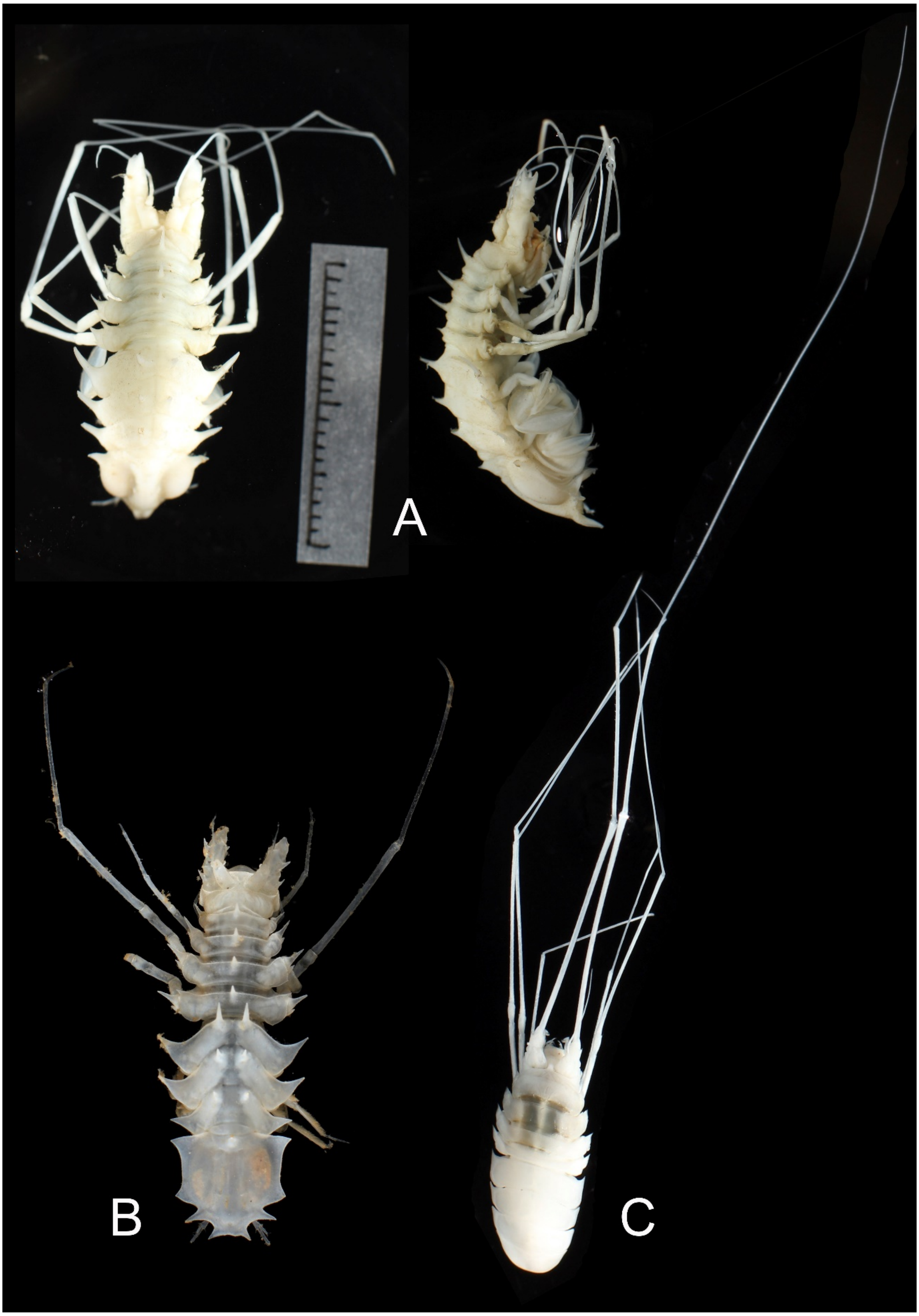

Fig. 75: The largest collected Munnopsidae in good condition: A, Vanfoeffenura chelata (Birstein, 1957), st. 86; B, Rectisura herculea (Birstein, 1957), st. 19; Munneurycope sp. st. 28. © Maiorova.

7.23. Amphipoda of the Kuril-Kamchatka Trench and adjacent abyssal area

Anna Jażdżewska

7.23.1. Objectives

Amphipoda belong to one of the most abundant and diverse groups in the abyssal zone. The area of Kuril-Kamchatka was studied in the middle of 20th century during several R/V *Vitjaz* cruises. They resulted in the characterization of the abyssal and hadal fauna of the area and the description of several new species. However, the gears used at that time did not allow collecting animals of small sizes, which was already mentioned in the case of isopods (Birstein 1971). Due to that only 18 amphipod species from abyssal and hadal zones of Kuril-Kamchatka area were recorded. In 2012 successful expedition (KuramBIO) to the abyss of Kuril-Kamchatka region was performed and a large collection of Amphipoda was obtained. The study resulted in recognition of 79 morphospecies belonging to 23 families, out of which at least 28 are new to science (Jażdżewska 2015).

Amphipods are brooders and apart from the truly pelagic representatives of the suborder Hyperiidea and a few representatives of the suborder Gammaridea have low dispersal capacity. For the benthic abyssal Amphipoda the presence of the trench can constitute as a barrier for the dispersal.

The objectives of the study were:

- to describe the amphipod species assemblages on both sides of the Kuril-Kamchatka Trench as well as the assemblage of the hadal zone of the trench itself;

- to investigate if the trench constitute as a barrier for the benthic species dispersal.

7.23.2. Work at sea

The material for present study was collected using epibenthic sledge at 11 stations. The preliminary identification of Amphipoda was possible for samples from 8 stations (12 samples). In total 846 individuals were checked.

7.23.3. Preliminary results

In the studied material 66 taxa (morphospecies) belonging to 22 families were identified. The most abundant families were Phoxocephalidae (23% of individuals) followed by Pardaliscidae and Stegocephalidae (13% of ind. each) (fig. 76). Next four families have had a dominance between 11% and 7%. Lysianassidae appeared to be the most speciose family represented by 11 species. The second most diverse group was the family Pardaliscidae (9 species).

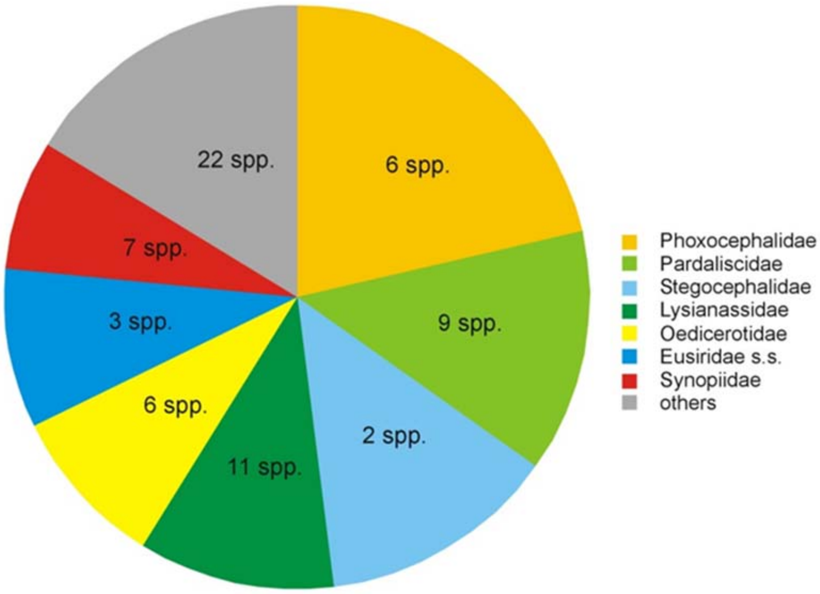

Fig. 76: Dominant amphipod families in the samples.

The number of individuals and species differed significantly between the sites but no pattern associated with depth could be observed (Fig. 77).

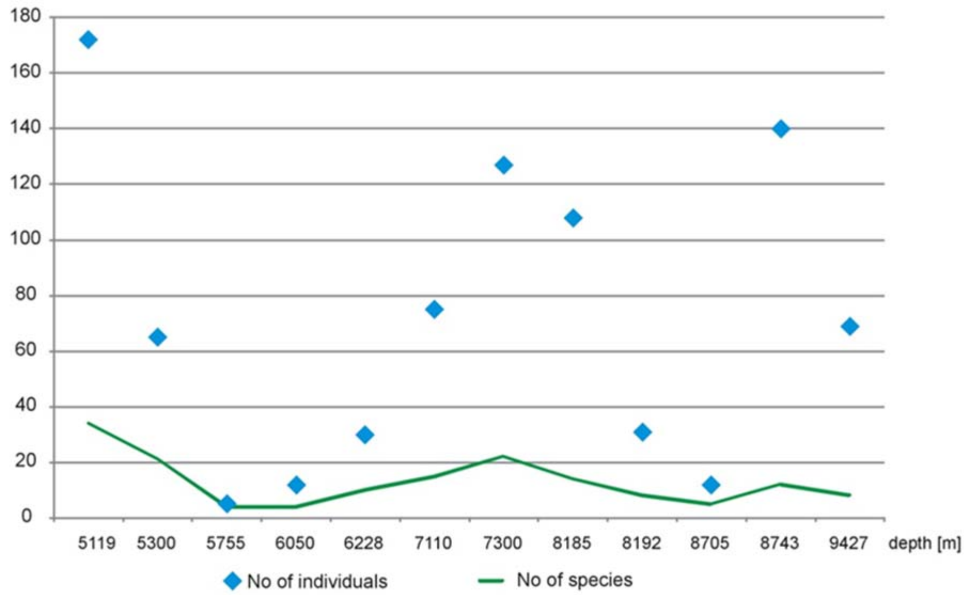

Fig. 77: Number of individuals and species in each sample studied.

The species composition varied also at different stations (Fig. 77). At the stations shallower than 6000 m the presence of phoxocephalid species belonging to the genus *Leptophoxus* was pronounced. This species was not found at any deeper station. At the same time at the depths between 5300 and 8000 m the important role played *Rhachotropis* sp. 1. Deeper the dominance of two other phoxocephalid species (Harpiniinae sp. 1 and H. sp. 6) could be noticed. At the deepest station the sample was dominated by two species from the family Pardaliscidae - *Princaxelia* cf. *jamiesoni* (Fig. 78) and Pardaliscidae sp. 8. The first species was caught in large numbers in baited traps which can suggest the presence of carrion in the area sampled (Lörz 2010).

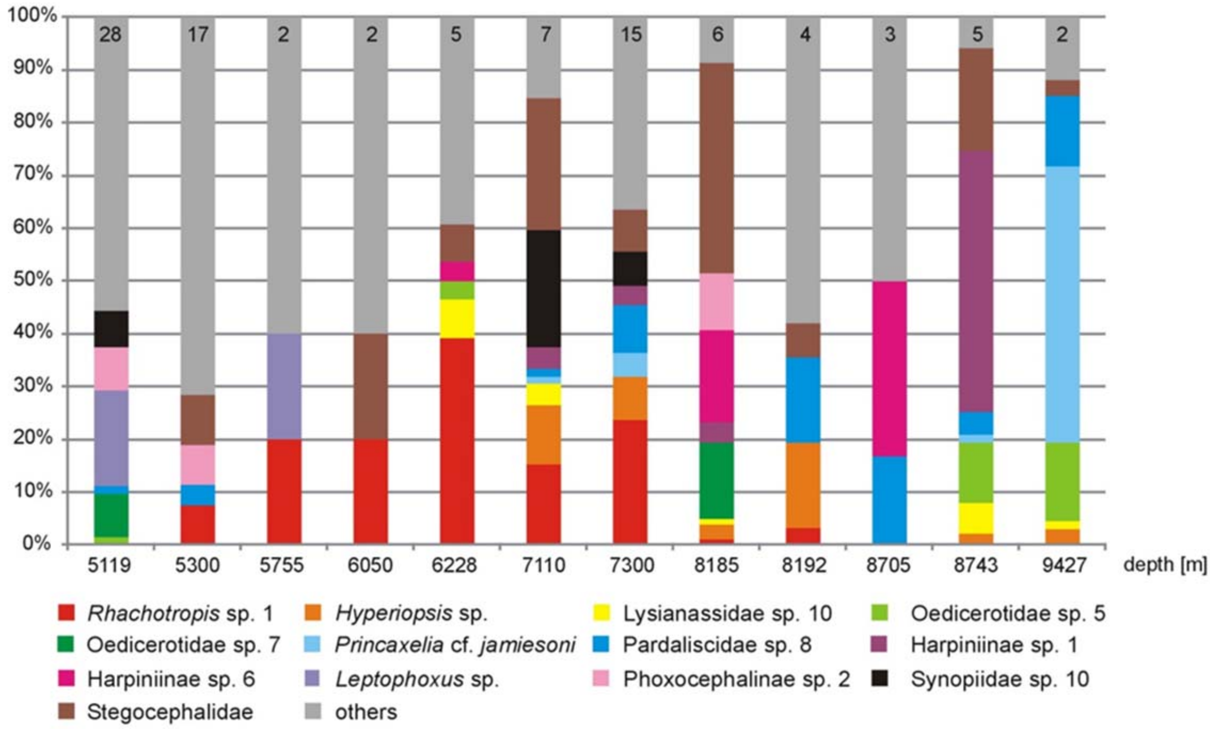

Fig 78: Species composition at different stations (the number in the grey bar indicates how many species accounted for the "others" group).

Fig. 79: *Princaxelia* cf. *jamiesoni* (photo: A. Jażdżewska).

Additionally to the species identification tissue samples for DNA extraction were taken and total DNA was extracted from 112 individuals from 14 families. The amplification of the COI gene resulted in obtaining the product for 59 individuals.

7.24. Tanaidacea

M. Błażewicz

7.24.1. Objectives

Tanaidacea is an order of free-living crustaceans belonging to the Peracarida, which rarely exceed 2 mm in size. It has been reported in all marine benthic habitats and all depths. Despite the paucity of data, Tanaidacea already appear highly diverse and very abundant in the macrobenthos, only a small fraction (2–3%) of the real diversity of this crustacean order is known, with c.a. 1300 nominal species of tanaidaceans formally described (Appeltans. et al. 2012)

Tanaidacea in the KKT and adjacent area have been hardly investigated before. Any information about Tanaidacea in the region comes from few taxonomic papers (e.g. Kudinova-Pasternak, 1970; Larsen and Shimomura, 2007). Altogether not more than 40 species of Tanaidacea have been described from the region from the depth >1000 m. We therefore aimed at an analysis of the composition of the tanaidacean fauna.

7.24.2. Work at sea

During the current expedition Kuram Bio II 489 speciemens of Tanaidacea collected by multicorer (MUC), boxcorer (GKG), epibenthic sledge (EBS) and Agassiz trawl (AGT) have been identified to any possible level (family, genus, species).

7.24.3. Preliminary results

The most aboundant families were Pseudotanaidae (25%), Akanthophoreidae (24%), followed by Agathotanaidae (16%) (Fig. 81B), Typhlotanaidae (9%), Neotanaidae (5%), Colletteidae (4%) (Fig 81C), Cryptocopoididae (3%) (Fig. 81D) and Anarthruridae (2%). Other families (Apseudidae, Leptocheliidae and genera of family incertae sedis with lover than 2 % contribution to the material (e.g. Forcipatia, Leptognathioides, Insociabilitanais, Exspina) represent category “others”.

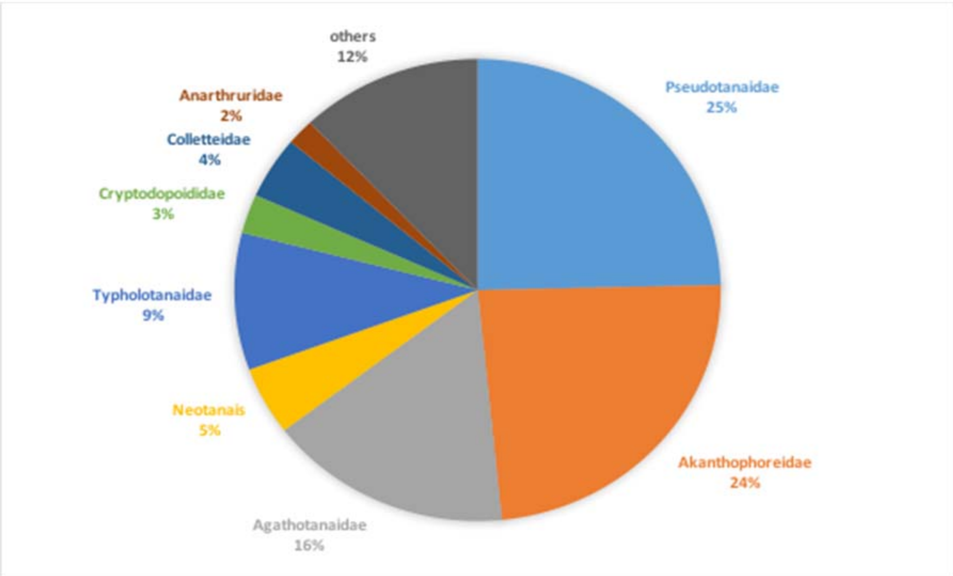

Fig 80: Family composition of Tanaidacea collected during KuramBio II.

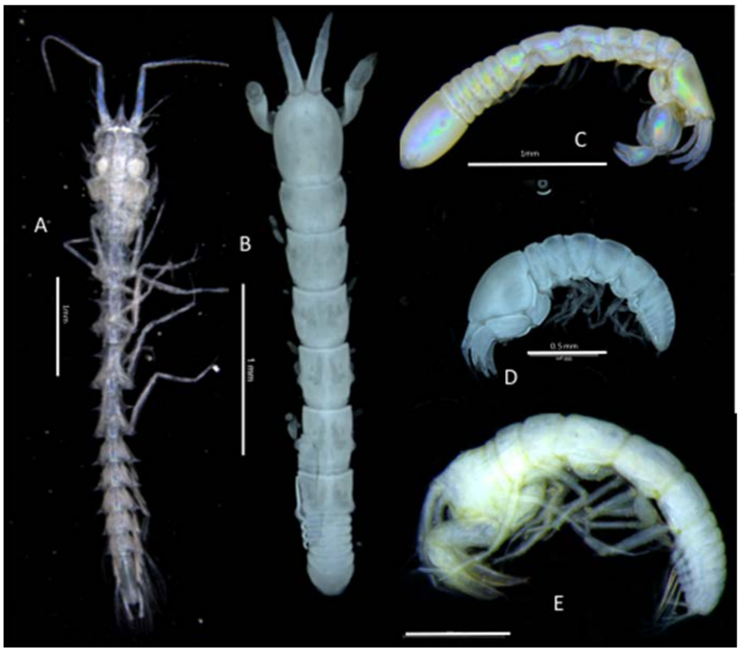

Fig. 81: Tanaidacea in Kuril-Kamchatka Trench and adjacent area. A. *Leviapseudes* sp. (Apseudidae), B. *Agathotanais* sp. (Agathotanaidae), C. *Collettea* sp. 1 (Colletteidae), D. Crypotocopoides (Cryptocopoididae); E. *Pseudotanais* sp. (Pseudotanaididae).

The most abundant and the most frequent genus in the whole collection was Pseudotanais (Fig. 81 E) - the only genus of the family Pseudotanaididae. Before KuramBio, only four species from this genus were known in the NW (P. vitjazi Kudinova-Pasternak, 1970, P. nipponicus McLelland, 2007, P. intortus Błażewicz-Paszkowycz, Bamber & Jóźwiak, 2013, Pseudotanais soja Błażewicz-Paszkowycz, Bamber & Jóźwiak (Fig. 82). The preliminary identification of 108 specimens allows to distinguish at least 5 distinctive species, although more species are expected to be discovered using molecular methods (barcoding).

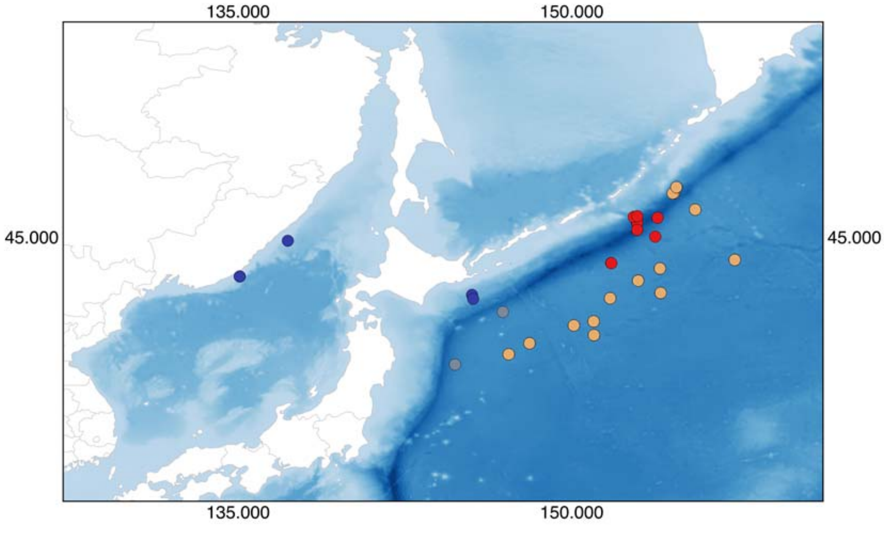

Fig. 82: Distribution of the genus Pseudotanais in KKT and adjacent area collected with different expeditions: grey – RV Vitjaz (KudinovaPasternak 1970); blue SoJaBio and R/V Hakuho Maru (McLelland, 2007; Błażewicz-Paszkowycz et al. 2013): yellow KuramBio1 (unpublished data); red - KuramBio2.

The diversity (and proably abundance) of Tanaidacea decreases with the depth gradient. Below 8200 m only members of the family Akanthophoreidae were found (Fig. 83). The stations with lower tanaidacean diversity and abundance were A3 andA6.

The most diverse and abundant was station A8, where nearly 50% of the specimens were found. At this station Pseudotanais birsteini was recorded from the piece of sunken wood collected with AGT. Additionally at that station two specimen of Exspina typica, the parasite of deep sea holothurian (Alvaro et al. 2011), were collected.

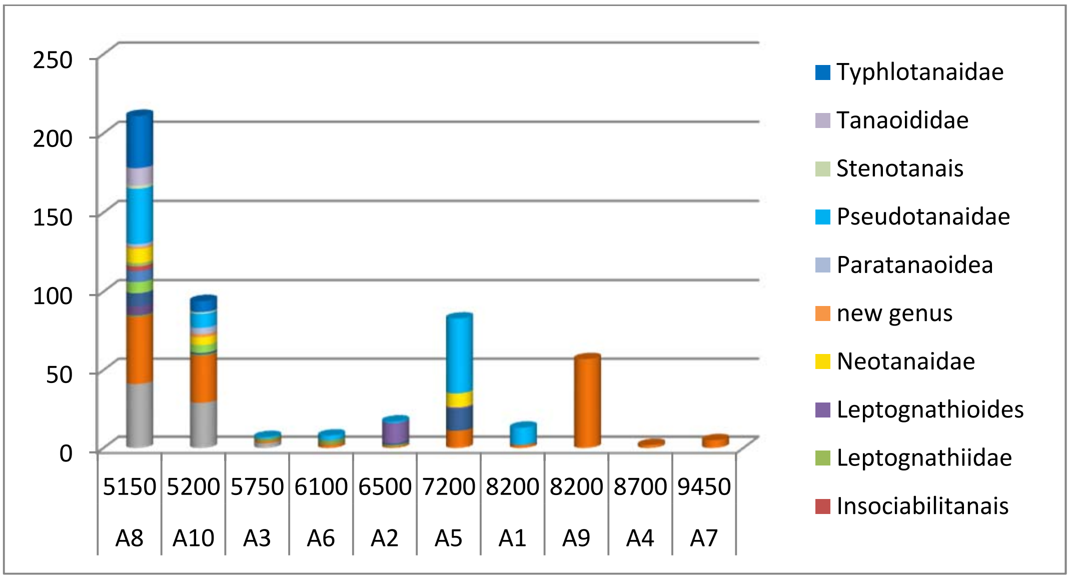

Fig. 83: Composition of the tanaidacean family at KuramBio2 stations (all gears).

Tanaidacea preserved according to the cool chain protocol (Riehl et al, 2014) DNA will be used used for molecular analyses in future. On bord DNA was extracted with Chelex (40-50 µl). Cytochrome oxidase subunit I (COI) DNA was amplified using PCR primers (polyLCO/polyHCO; copLCO/HCO). Electrophoresis was performed on a 1% Agarose Gel stained with GelRed using 1µl of PCR product.

7.25. Epicaridean isopods (Bopyroidea and Cryptoniscoidea) from the Kurile-Kamchatka Trench and adjacent abyssal area

O. Golovan, A. Petrunina

7.25.1. Background

Epicaridean isopods represent a former isopod suborder Epicaridea, which now is treated as a part of the suborder Cymothoida (Brandt and Poore, 2003). They include two parasitic superfamilies Bopyroidea (three families) and Cryptoniscoidea (nine families), which members infest other crustaceans. During a life circle epicarideans undergo a regressive metamorphosis with changing of three larva stages and two hosts. The first larva stage (epicaridium) is free-swimming until it attaches to the intermediate host (copepod). Second stage (microniscus) is parasitic. Third stage (cryptoniscus) is free-swimming until if found a final host which can be different crustaceans (Decapoda, Ostracoda, Cirripedia, Isopoda, Amphipoda, Mysida, Euphausiacea). In Bopyroidea the first cryptoniscium to settle becomes female and subsequent individuals become male(s). The males of cryptoniscoids retain the cryptoniscus larval form (Williams, Boyko, 2012). Each stage morphologically differs from the others. Larval stages have an isopod morphology, while in adult female its segmentation and appendages are reduced or (in some Cryptoniscoidea) completely lost. For many cryptoniscoidean species only planktonic cryptoniscus stage is known, while descriptions of most of the bopyriodean species based only on the adult females. Epicarideans are a diverse group, representing almost 800 species (7.7% of described isopod species), most of them (76%) belongs to the well-studied family Bopyridae (Williams, Boyko, 2012). Most species are known from shallow waters. Two species were described from the abyss (down to 4860 m) and one undescribed species was reported down to 5210 m (Williams, Boyko, 2012). In the boreal Northwest Pacific until now 12 epicaridean species were known (Check-list of species of free-living invertebrates of the Russian Far Eastern seas, 2013), including two abyssal species of the bopyroidean family Dajidae (Richardson, 1908). The systematics of the group is insufficiently studied and the phylogenetic relationships are poorly known (especially for cryptoniscoideans). Difficulties in the studies of the group are due to the high polymorphism and spatial and ecological separation of the life stages, cryptic character of the adult animals, which are often highly reduced, lack of information about final hosts and impossibility to link the larval stages (possessing rich morphology) with adult animals.

7.25.2. Objectives

The aim of our study is to obtain an insight in the diversity of the epicaridean isopods of the Kurile-Kamchatka Trench and adjacent abyss, using a complex approach which includes morphological and genetic studies.

7.25.3. Work at sea

The material was collected with EBS, GKG, AGT and MSN. DNA extraction was performed on board using Chelex DNA extraction protocol, which allows retrieving the voucher specimens almost intact for morphological analysis. CO1, 18S and 28S genes have been successfully amplified for all parasitic isopods.

7.25.4. Preliminary results

Epicarideans occurred at 12 stations and six areas of the expedition at depths range from 5120 to 8738 m (Table 22). Cryptoniscium larvae were represented by at least 5 morphospecies. Three species were found at the abyssal stations. From these cumacean infesting Cryptoniscoidea gen.sp.1 (Fig. 85) was more frequent, occurring at three areas and gen sp.2 – at two areas. Another two species (sp. 3 and 4) were found at the hadal depths (6445 and 8738 m). These are the deepest findings of epicarideans until now.

One specimen of the isopod from the bopyroidean family Dajidae was found in plankton sample collected using Multinet from depth 3000-1000 m (St. 60). One cm long deep red colour female was detached from the host. However, in the sample we found a decapod caridean crustacean of the appropriate size and colour that could potentially have served as a host for the Dajidae. Close examination of the dorsal side of carapace of the potential host could reveal marks of the parasite attachment to prove the host – parasite relationships of these two specimens. Inside the brooding chamber of the dajid female we discovered single dwarf male. Both female and male were still alive and moving, enabling us to take rare live photographs and even videos of the Isopoda: Dajidae.

Fig. 84: Dajidae gen. sp., female. Photo by Anastassya Maiorova.

One cryptoniscus larva of Cryptoniscoidea gen. sp. was found as a hyperparasite on Parascothorax sp. (Ascothoracida). Even though hyperparasitic relationships are characteristic for some Cryptoniscoidea (several species parasitize Cirripedia: Rhizocephala) until now isopods has never been reported from Ascothoracida.

It is possible, that molecular studies will allow us to associate the epicaridium larvae of Cryptoniscoidea sp. 1-1 (St. 23) and some of the cryptoniscus larvae with the mature epicarideans.

Table 22: List of the epicaridean morphospecies collected during the KuranBio II cruise.

			Area	A3	A3	A4	A6	A6	A8	A8	A10	A10	A2
			Depth	5739	5741	8738,9	5960	6066	5210,1	5120			6445,6
N	**Taxa**	**sp.**	**host**	60	61	49	23	25	7	10	85	87	98
1	Cryptoniscoidea	gen.sp.1 (cryptoniscus)	Cumacea		1					1	1		
	Cryptoniscoidea	gen.sp.1-1 (epicaridium)					1						
2	Epicaridea	gen.sp.2 (cryptoniscus)								2		1	
3	Epicaridea	gen.sp.2-1 (cryptoniscus)								1			
4	Epicaridea	gen.sp.3 (cryptoniscus)				1							
5	Epicaridea	gen.sp.4 (cryptoniscus)											1
	Cryptoniscoidea	gen. sp. (cryptoniscus)	Ascotoracidae						1				
	Dajidae	gen.sp. (female with male)	Decapoda (?)	2									
	Epicaridea	gen.sp.						1					

Fig. 85: Cryptoniscium of Cryptoniscoidea gen sp.1 attached to the cumacean *Hemilamprops* sp. St.85. Photo by Anna Lavrenteva.

7.26. Cumaceans collected in the KuramBio II expedition by means of EBS

A. Lavrenteva

7.26.1. Objectives

The aim of this study is to gain insight into the diversity of the cumacean fauna of the Kurile-Kamchatka Trench and adjacent abyssal slope.

7.26.2. Work at sea

Samples were taken from various gear, howeve, most cumaceans came from the epibenthic sledge catches.

7.26.3. Preliminary results

Before the KuramBio II the deepest record of cumaceans was at 8042 m depths from the Palau trench (Belyaev, 1989). Thus, species *Platycuma* sp. collected in KuramBio II at the depths of 8743 m - the deepest record of the order Cumacea.

In the KuramBio II EBS samples sorted on board Cumacea were represented by 29 species, 15 genera and five families. About 19 species identified from EBS material were also collected during the KuramBio I, and 5 of them are known for the Japan trench.

The most abundant family was Nannastacidae (6 species, 3 genera, 36% of all cumaceans specimens) followed by Leuconidae (6 species, 4-5 genera, 25%). The Diastylidae (9 species, 4 genera, 16%) was the most speciose family. Family Bodotriidae presented by 5 species from deep-sea genus *Bathycuma* and consist 36% of all checked cumaceans. The family Lampropidae is smallest in terms of abundance (10% of all cumaceans specimens) and by number of species (3 species, 3 genera).

The deep-sea cumacean fauna collected during the KuramBio II expedition is represented by 9 widespread deep-sea genera: *Bathycuma* (Bodotriidae), *Leptostyloides, Makrokylindrus* and *Pseudoleptostyloides* (Diastylidae), *Paralamprops* (Lampropidae), *Abyssoleucon* and *Bytholeucon* (Leuconidae), *Platycuma* and *Styloptocuma* (Nannastacidae) and 6 widespread eurybathic genera: *Leptostylis* (Diastylidae), *Hemilamprops* and *Mesolamprops* (Lampropidae), *Eudorella* and *Leucon* (Leuconidae), *Campylaspis* (Nannastacidae).

The most diverse genera were *Bathycuma* (5 species) followed by the genera *Campylaspis* (4 species), *Leptostylis* and *Makrokylindrus* (each represented by 3 species). The most abundant genus was *Platycuma* (32% of all cumaceans specimens) followed by *Bathycuma* (13%) and *Bytholeucon-Abyssoleucon* (13%).

Platycuma sp. occurred most frequently and was found at 6 EBS stations (st. 10, 17, 40, 42, 52, 55). *Hemilamprops* sp. was found at 5 stations (st. 8, 10, 40, 42, 85).

The faunal composition of cumaceans is different at abyssal and hadal depths (Fig. 86). Between depths of 4903-6228 m the family Diastylidae dominated in terms of abundance and species richness, but at the hadal stations between 7110-8743 m no one Diastylidae were found. The frequency of occurrence of Nannastacidae increases from 15% at abyssal stations to almost 50% in the hadal. On the stations 52 and 53 (8704-8743 m) only one species - *Platycuma* sp. (Nannastacidae) (Fig. 87) was found and on the deepest station 77 (9427 m) no cumacean specimens was found.

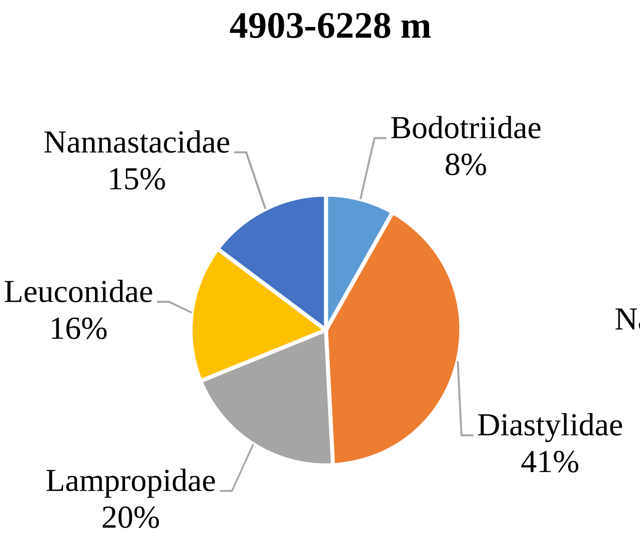

Fig.86: Abundance of cumaceans families on abyssal (4903-6228 m) and hadal (7110-8743 m) depth.

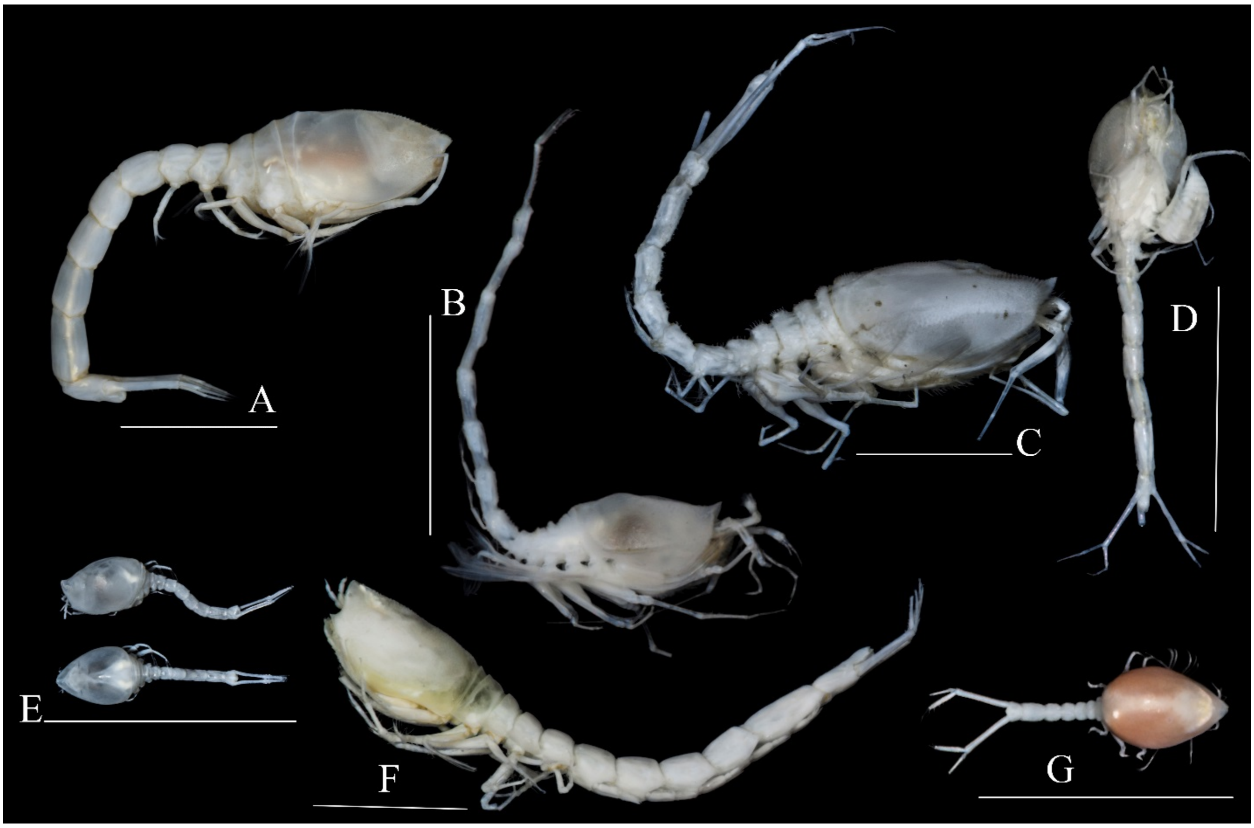

Fig.87: Some cumaceans collected during the KuramBio II expedition: A – *Bathycuma* sp.; B – *Leptostyloides* sp.; C – *Makrokylindrus* sp.; D – *Hemilamprops* sp. with cryptoniscoid larva; E – deepest cumacean *Platycuma* sp. from 8740 m; F – *Bathycuma granulatum* Gamo, 1989; G – *Campylaspis* sp. Scale bars: 5 mm.

7.27. Species diversity of Vetigastropoda and Caenogastropoda (Mollusca: Gastropoda) in the Kuril-Kamchatka Trench

H. Fukumori

7.27.1. Objectives

Gastropoda (Mollusca) represent one of the most diverse groups of trench fauna (Beliaev, 1989). At least seventeen gastropod species have been found at hadal depth (6,000–9,530 m) in the Kuril-Kamchatka Trench (Beliaev, 1989; Jamieson 2015). The aim of the study in the Kuril-Kamchatka Trench is to understand the species diversity of the Vetigastropoda and Caenogastropoda. These two clades are major taxonomic groups of deep-sea gastropod molluscs.

7.27.2. Work at sea

During the KuramBio II cruise, gastropod molluscs were collected for morphological and genetic studies using a giant box corer (BC), multicorer (MUC), epibenthic sledge (EBS) and Agassiz trawl (AGT). Gastropod specimens were found from four BC, one MUC, twelve EBS and fourteen AGT samples. Gastropod specimens were fixed in 96% undenatured ethanol or 4% formalin.

7.27.3. Preliminary results

In total, 618 live specimens of thirteen vetigastropod and twenty-five caenogastropod species were collected from the KuramBio II expedition, of which 407 (66%) were of the Vetigastropoda clade and 211 (34%) were of the Caenogastropoda clade. Of these collected specimens, 124 specimens of five vetigastropod and fifteen caenogastropod species were found at hadal depth. The greatest number of specimens were found at area A8 (N = 309) and no specimens were collected at area 11. I found twenty-three specimens of a seguenzioid species (*Trenchia*? sp.) in the clade Vetigastropoda (Fig. 88) from EBS (station SO250_77: 9584 m depth) and AGT (SO250_78: 9582 m depth) samples at area A7. This was the deepest record of gastropod molluscs in the Kuril-Kamchatka Trench. Preliminary results for each area are listed below:

Area A8: 9 families 22 species - Superfam. Seguenzioidea (6 species); Fam. Scissurellidae (1 species); Fam. Skeneidae (1 species); Fam. Buccinidae (3 species); Fam. Eulimidae (3 species); Fam. Epitoniidae (1 species); Fam. Naticidae (1 species); Fam. Rissoidae (1 species); Fam. Turridae (4 species)

Area A1: 2 families 2 species - Fam. Buccinidae (1 species); Fam. Eulimidae (1 species)

Area A6: 3 families 3 species - Fam. Buccinidae (1 species); Fam. Naticidae (1 species); Fam. Velutinoidae (1 species)

Area A5: 3 families 7 species - Superfam. Seguenzioidea (3 species); Fam. Buccinidae (2 species); Fam. Turridae (2 species)

Area A4: 2 families 3 species - Superfam. Seguenzioidea (1 species); Fam. Eulimidae (2 species)

Area A3: 3 families 4 species - Superfam. Seguenzioidea (2 species); Fam. Buccinidae (1 species); Fam. Muricidae (1 species)

Area A7: 1 family 2 species - Superfam. Seguenzioidea (2 species)

Area A10: 6 family 9 species - Fam. Lepetellidae (1 species); Superfam. Seguenzioidea (2 species); Fam. Buccinidae (1 species); Fam. Eulimidae (1 species); Fam. Naticidae (1 species); Fam. Turridae (3 species)

Area A9: 2 family 3 species - Superfam. Seguenzioidea (2 species); Fam. Buccinidae (1 species)

Area A2: 5 family 8 species - Superfam. Seguenzioidea (2 species); Fam. Buccinidae (3 species); Fam. Naticidae (1 species); Fam. Rissoidae (1 species); Fam. Turridae (1 species)

Area A11: No gastropods

Figure 88: Seguenzioid gastropod species (*Trenchia*? sp.) collected at area A7.

7.28. Polychaeta of Kuril-Kamchatka Trench and adjacent abyssal area collected during the KuramBio II expedition

I. L. Alalykina

7.28.1. Objectives:

The information on the deep-sea polychaete fauna of the Pacific Ocean is scarce although polychaetes belong to one of the most abundant and most diverse invertebrate groups in marine environments world wide. We therefore wanted to analyse the composition of polychaetes at the different stations and depths.

7.28.2. Work at sea:

During the current expedition KuramBio II about 14190 specimens of Polychaeta were collected with the Epibenthic sledge (EBS), Agassiz trawl (AGT), giant Box-corer (GKG) and MultiNet - Multiple Plankton Sampler (MSN) (Table 23).

7.28.3. Preliminary results:

The most abundant and diverse polychaete material was sampled by the Epibenthic-sledge (about 9800 specimens). This gear is designed for sampling small epifauna or suprafauna individuals or also meiofauna organisms ranged in length between 1 mm and 1 cm at any depth and on any substrate. The Agassiz trawl, with a mesh size of 1 cm, seems to be the least effective gear to capture small abyssal polychaetes, but more suitable for capture large adult worms. The preliminary identification of Polychaeta was mainly possible for AGT and MSN-samples during the expedition (Table 24, Fig. 89).

Table 23: Polychaete abundance (number of specimens) sampled by the different types of gear.

Gear		EBS		AGT		Box-Corer		MSN		
Area	Depth, m	St	N	St	N	St	N	St	N	
A1	8200	st 17 st 19	945 17	st 18 st 20	4 20	st 14	16	st 13	30	
A2	6400	st 97	21	st 98	140	st 94	118	st 93	27	
A3	5755	st 65	2	st 64	214	st 61	149	st 60	51	
A4	8700	st 52 st 55	1475 370	st 54	12	-	-	st 47	41	
A5	7200	st 40 st 42	834 1783	st 41 st 43	73 226	st 37	190	st 34	42	
A6	6200	st 28 st 30	340 863	st 29 st 31	324 36	st 25	68	st 23	19	
A7	9580	st 77	1171	st 78	15	st 67	175	-	-	
A8	5150	st 8 st 10	507 1087	st 7 st 9	425 153	st 6	28	st 3	7	
A9	8200	st 89	18	st 90	116	st 75	125	st 73	33	
A10	5500	st 85 st 87	28 314	st 86	686	st 82	93	st 81	44	
A11	9430	st 102	34	st 103	313	st 105	241	st 106	27	
Total			9809		2757		1311		321	14198

Totally about 76 species from 70 genera and 41 families have been identified from AGT and MSN-samples so far. After the preliminary identification some of them species seem to be new to science. The most abundant families were the Sabelliriidae (ca. 370 spec.), the Capitellidae (280 spec.), the Fauveliopsidae (220 spec.), the Opheliidae (200 spec.) and Ampharetidae (160 spec.). The most speciose family was the Ampharetidae with about 9 species. The most numerous and frequent species were *Amphicteis* sp., *Notomastus* cf. *latericeus*, *Brada* sp., *Kesun* sp. and *Galathowenia lobopygidiata.*

The distribution of polychaetes within AGT-stations varied significantly. Polychaete abundance in terms of number of specimens ranged from 4 to 680, and the number of species per station ranged from 5 to 26 (Fig. 87). The highest number of species was found at the area A8 (5150 m) and the high polychaete abundance was observed at the A10 (5500 m). The lowest abundance and number of species from AGT-samples were found at the hadal stations at the area A1, A4 and A7 (8200-9580 m). The diversity of polychaetes at the hadal stations A9 and A11 was also lower than in the abyssal stations, but with rather high abundance of a few deposit-feeders species like *Notomastus* cf. *latericeus, Cossura* sp. and *Brada* sp. (Fig. 90).

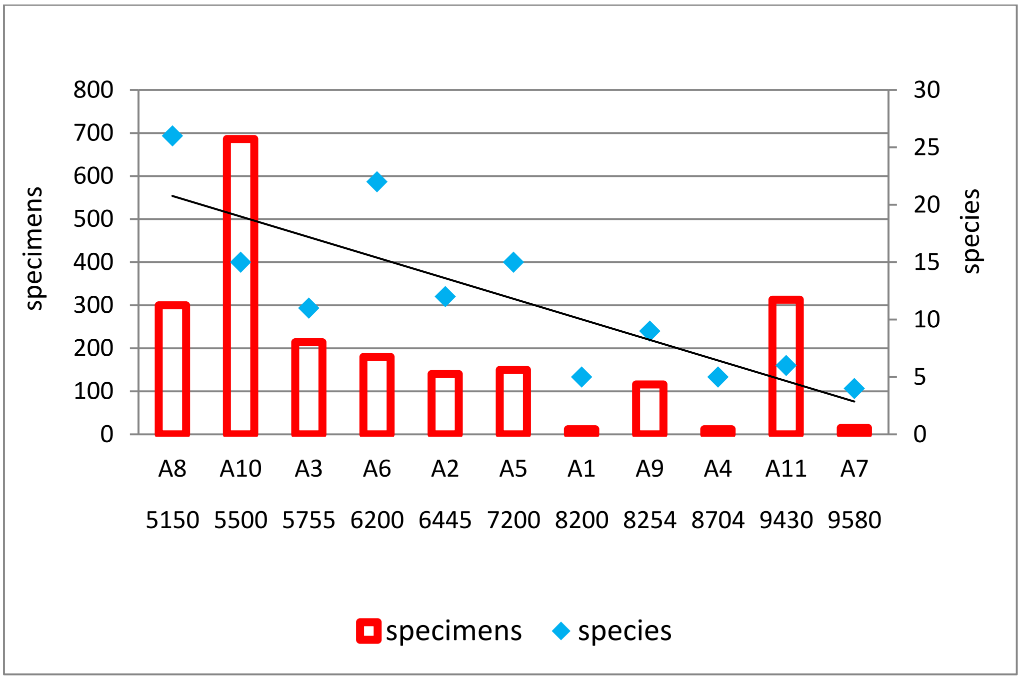

Fig. 89: Distribution of abundance and species richness of Polychaeta on AGT-gear data ordered by depth.

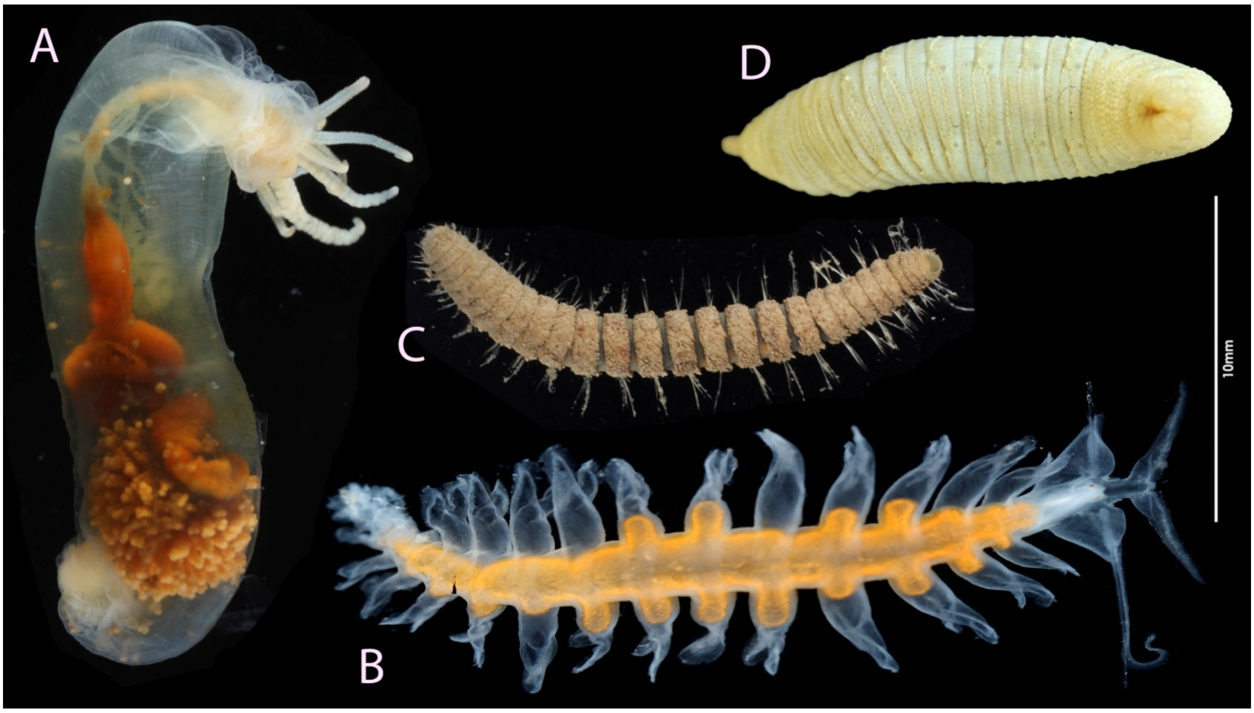

Fig. 90: Some pelagic (A, B) and benthic (C, D) polychaetes collected during the KuramBio II expedition: A – *Poeobius* sp., B – *Tomopteris* sp., C – *Brada* sp., D – *Kesun* sp. (Foto by Anastassya S. Maiorova).

Table 24: List of polychaete species from the Kuril–Kamchatka Trench, Northwest Pacific.

Family	Species	Gear	Station	Depth, m
Acrocirridae	*Flabelligena* sp.	AGT EBS	SO250_7, SO250_10	5200
	Acrocirrus sp.	EBS	SO250_42, SO250_97	6400-7100
Apistobranchidae	*Apistobranchus* sp.	AGT	SO250_29	6200
Ampharetidae	*Amage* cf. *auricula*	AGT	SO250_31	6200
	Amage cf. *anops*	AGT	SO250_31, SO250_41, SO250_43	6200-7200
	Ampharete sp.	AGT EBS	SO250_29, SO250_31, SO250_90, SO250_97	6200-8200
	Amphicteis spp.	AGT EBS	SO250_7, SO250_9, SO250_18, SO250_19, SO250_20, SO250_29, SO250_40, SO250_41, SO250_42, SO250_43, SO250_87, SO250_89, SO250_90, SO250_97	5100-8200
	Anobothrus sp.	AGT EBS	SO250_7, SO250_8, SO250_9, SO250_28, SO250_29, SO250_30	5100-6200
	Melinnampharete sp.	AGT	SO250_7, SO250_29, SO250_31	5100-6200
	Samythella elongata	AGT EBS	SO250_7, SO250_9, SO250_10	5100-5200
	Melinantipoda sp.	AGT EBS	SO250_7, SO250_9, SO250_10	5100-5200
	Ampharetidae gen. sp.	AGT EBS	SO250_42, SO250_64, SO250_86, SO250_87, SO250_98	5400-6400
Capitellidae	*Notomastus* cf. *latericeus*	AGT EBS	SO250_17, SO250_19, SO250_20, SO250_29, SO250_40, SO250_41, SO250_42, SO250_43, SO250_54, SO250_64, SO250_78, SO250_86, SO250_87, SO250_90, SO250_98, SO250_89, SO250_102, SO250_103	5700-9500
Chaetopteridae	*Spiochaetopterus* sp.	AGT	SO250_29, SO250_31, SO250_64, SO250_86, SO250_87	5400-6200
Cirratulidae	*Chaetosone* sp. 1	EBS	SO250_42, SO250_52	8700
	Cirratulidae gen. sp.	AGT EBS	SO250_29, SO250_64, SO250_86, SO250_97	5400-6200
Cossuridae	*Cossura* sp.	AGT EBS	SO250_42, SO250_54, SO250_78, SO250_103	8700-9500
Euphrosinidae	*Euphrosine* sp.	EBS	SO250_42	7100
Fauveliopsidae	*Laubieriopsis hartmani*	AGT EBS	SO250_29, SO250_31, SO250_42, SO250_86	5400-6200
	Fauveliopsis sp.	AGT EBS	SO250_7, SO250_9, SO250_10, SO250_87	5100-5200
Flabelligeridae	*Pherusa* sp.	AGT	SO250_29, SO250_31	6100-6200

	Brada sp.	AGT EBS	SO250_17, SO250_19, SO250_20, SO250_41, SO250_43, SO250_52, SO250_54, SO250_55, SO250_86, SO250_87, SO250_90	5400-8700
	Diplocirrus sp.	EBS	SO250_85	5200
Glyceridae	*Glycera* sp.1	AGT EBS	SO250_86, SO250_98	5400-6400
	Glycera sp.2	EBS	SO250_87	
Goniadidae	*Glycinde lindbergi*	AGT EBS	SO250_7, SO250_10, SO250_42	5100
Hesionidae	Hesionidae	EBS	SO250_42, SO250_97	
Lopadorrhynchidae	*Maupasia coeca*	MSN	SO250_3, SO250_81	250-1000
	Pelagobia longicirrata	MSN	SO250_3, SO250_13, SO250_23, SO250_34, SO250_47, SO250_60, SO250_73, SO250_81, SO250_93, SO250_106	500-3000
Lumbrineridae	*Augeneira* sp.	AGT EBS	SO250_7, SO250_10, SO250_28	5100
	Lumbrineridae gen. sp.	AGT EBS	SO250_10, SO250_29, SO250_31, SO250_41, SO250_42, SO250_43, SO250_87, SO250_98	6100-7200
Nereidae	*Ceratocephale* sp.	EBS	SO250_42	7100
Nephtyidae	*Micronephtys* sp.	AGT EBS	SO250_52, SO250_90	8200-8700
Maldanidae	*Maldanella parafibrillata*	AGT EBS	SO250_7, SO250_87	5100
	Maldanella cf. *antarctica*	AGT	SO250_7, SO250_9, SO250_97, SO250_98	5100-6400
	Maldanella cf. *fibrillata*	AGT	SO250_7	5100
	Notoproctus sp.	EBS	SO250_97	
	Maldanidae fr	AGT	SO250_43, SO250_64, SO250_87, SO250_97, SO250_98	5700-7200
Onuphidae	*Paradiopatra* sp.	AGT EBS	SO250_7, SO250_9, SO250_10, SO250_64	5100-5700
Opheliidae	*Ophelina* sp.	AGT EBS	SO250_8, SO250_10, SO250_28, SO250_29, SO250_40, SO250_41, SO250_42, SO250_54, SO250_55, SO250_86, SO250_87, SO250_90	5400-8700
Travisiidae	Travisia cf. *profundi*	AGT EBS	SO250_7, SO250_8, SO250_28, SO250_29, SO250_31, SO250_41, SO250_42	5100-7100
	Travisia sp.	AGT EBS	SO250_10, SO250_43, SO250_89, SO250_98	5400-7200
	Kesun sp.	AGT EBS	SO250_9, SO250_10, SO250_17, SO250_18, SO250_19, SO250_20, SO250_28, SO250_29, SO250_30, SO250_31, SO250_40, SO250_41, SO250_42, SO250_43, SO250_52, SO250_78,	5100-9500

			SO250_85, SO250_86, SO250_90, SO250_87, SO250_97, SO250_98, SO250_103	
Orbiniidae	Orbiniidae gen. sp.	EBS	SO250_8	5100
Oweniidae	*Galathowenia lobopygidiata*	AGT	SO250_41, SO250_43, SO250_64	5700-7200
	Myriochele sp.	AGT	SO250_7, SO250_9, SO250_64	5100-5700
	Oweniidae gen. sp.	AGT EBS	SO250_29, SO250_31, SO250_42, SO250_85, SO250_86, SO250_98	5400-6400
Paraonidae	*Aricidea* sp.	AGT EBS	SO250_10, SO250_40, SO250_42, SO250_86, SO250_103	5400-9500
	Paraonidae gen. spp.	EBS	SO250_42	7100
Phyllodocidae	*Eulalia* sp.	AGT EBS	SO250_7, SO250_17, SO250_28, SO250_29, SO250_40, SO250_41, SO250_42, SO250_43	5100-7200
	Paranaitis cf. *caecum*	AGT	SO250_9	5100
	Pterocirrus sp.	EBS	SO250_85	4900-5200
Poeobiidae	*Poeobius* sp.	MSN	SO250_47, SO250_73, SO250_81, SO250_93, SO250_106	500-3000
Polynoidae	*Macellicephaloides* sp.	AGT EBS	SO250_52, SO250_78, SO250_89	9500
	Macellicephala spp.	AGT EBS	SO250_41, SO250_43, SO250_55	7100-7200
	Polynoidae gen. spp.	AGT EBS	SO250_42, SO250_85, SO250_103	9400
Aphroditidae	*Laetmonice pellucida*	AGT EBS	SO250_7, SO250_8, SO250_9, SO250_10, SO250_86, SO250_87	5100-5400
Sabellidae	*Euchone* sp.	AGT EBS	SO250_29, SO250_31, SO250_42, SO250_86	5400-6200
	Sabellidae gen. sp.	AGT EBS	SO250_7, SO250_9, SO250_20, SO250_29, SO250_30, SO250_31, SO250_41, SO250_42, SO250_43, SO250_87	5100-8200
Scalibregmidae	*Pseudoscalibregma* sp.	AGT EBS	SO250_29, SO250_40, SO250_85, SO250_98	6100-6400
	Scalibregmidae gen.sp.	EBS	SO250_97	6500
Sabelliriidae	*Gesaia* cf. *vityazia*	AGT EBS	SO250_7, SO250_8, SO250_9, SO250_10	5100-5200
Serpulidae	Serpulidae gen. sp.	AGT EBS	SO250_7, SO250_10, SO250_64, SO250_86, SO250_87, SO250_103	5100-9400
Sigalionidae	Sigalionidae gen. sp.	AGT EBS	SO250_97, SO250_98	6400
Spaerodoridae	Spaerodoridae gen. spp.	EBS	SO250_10, SO250_87	5100-5500
Spionidae	*Prionospio* sp.	MSN	SO250_34, SO250_47, SO250_60, SO250_73, SO250_81, SO250_93	250-1000
	Spionidae gen. sp.	AGT EBS	SO250_42, SO250_98	6400

Syllidae	*Anguillosyllis capensis*	EBS	SO250_42	7100
Terebellidae	*Pista mirabilis*	AGT	SO250_7, SO250_9, SO250_64	5100-5700
	Pista sp. 1	AGT	SO250_7, SO250_9, SO250_64	5100-5700
	Pista sp. 2	AGT	SO250_7	5100
	Terebellidae gen.sp.	EBS	SO250_97	6440-6560
Tomopteridae	*Tomopteris* sp.	MSN	SO250_3, SO250_23, SO250_34, SO250_47, SO250_73, SO250_81, SO250_93, SO250_106	0-3000
Trichobranchidae	*Terebellides* sp.	AGT	SO250_29, SO250_54, SO250_90	6100-8700
Typhloscolecidae	*Travisiopsis* sp.	EBS MSN	SO250_13, SO250_23, SO250_42, SO250_60, SO250_93, SO250_106	
Spirorbidae	Spirorbidae gen. sp.	AGT	SO250_9, SO250_86	5100-5400

7.29. Phylum Nemertea (ribbon worms)

A.V. Chernyshev

7.29.1. Background

The phylum Nemertea, or ribbon worms, is a widely distributed group of vermiform invertebrates that are basically predators and scavengers feeding on small crustaceans, polychaetes, and molluscs. To date, about 1,300 species have been described, most of which inhabit the intertidal and sublittoral zones of the World Ocean. Quite recently, only five years ago, nothing was known about abyssal nemerteans, but, thanks to the material collected during four deep-sea expeditions (SoJaBio, KuramBioI, and SokhoBio), it has become evident that nemerteans are common members of abyssal benthic communities. Both published and unpublished data confirm the high species diversity of deep-sea nemerteans in the northwestern Pacific Ocean.

During Russian deep-sea expeditions in the Pacific ocean, fragments of unidentified nemerteans were detected only at seven stations deeper than 6 km in the Kuril–Kamchatka, Aleutian, Peru-, and South Sandwich Trenches at depths of 6000–7239 m (Belyaev, 1989). According to Zinkewitch et al. (1955 unidentified nemerteans were found in all six trawl samples from depths 1000–4640 m in the KKT), but only one specimen of unidentified nemertean was collected from depths 7210–7230 m. About 110 nemertean specimens were recorded from the AGT, box-corer, EBS, and Multinet samples of the KuramBioII expedition. The maximum depth at which benthic nemerteans were found is 9427 m (station 89). A vast majority of nemerteans belong to three groups: (1) tubulanid palaeonemerteans (Tubulanidae s.l.); (2) order Heteronemertea; (3) order Monostilifera; polystiliferous hoplonemerteans occur much more rarely. Nemerteans occur in both abyssal and hadal zones, but their abundance and species diversity in the hadal zone are much lower than in the abyssal zone.

Up to date, epibenthic sledge (EBS) is the most efficient gear to collect abyssal and hadal nemerteans: one EBS sample typically contains from 1 to 20 nemertean specimens, i.e. far more than can be found in Agassiz trawl catches or even in box-corer samples. Nemerteans collected using EBS are best preserved: a quick wash in a cold water and fixation with 95% ethanol allow better preservation of the material for both morphological and genetic studies.

Abyssal and hadal nemerteans do not have any specific color pattern, and live animals are colored monotonously: mostly in whitish, pinkish, or, rarely, in reddish and yellowish tones. Furthermore, they usually lack eyes, however two nemerteans with a pair of eyes were collected from stations 7 and 87 – they are the first observed eyed deep-sea nemerteans. Features of external morphology of deep-sea benthic nemerteans are scanty and do not allow their differentiation into “morphospecies”, as it can be done for shallow-water nemerteans, and so we can not estimate species diversity of the collected samples without special morphological investigaions and DNA analysis.

7.29.2. Work at sea

Nemertines have been retrieved from all gear and a preliminary identification has been done on board of RV Sonne.

7.29.3. Preliminary results

Two species are most interesting in collected material:

A new species of the enoplan nemertean associated with actinians from the genus *Galatheanthemum* was found at the station 43 (Fig. 91.1). Only one species, *Cryptonemertes actinophila*, was known as symbiont of the actinians, but it inhabits Arctic shallow-water.

The third species of the pelagic nemerteans of the family Korotkevitschiidae was collected by Multinet at the station 23 (Fig. 91.2). Hitherto only two species of Korotkevitschiidae have been described from the South Ocean, *Achoronemertes scoresbyi* and *Korotkevitschia pelagica.* The finding a new species of this family in North-West Pacific is unexpected and important for future biogeographical investigations.

Fig. 91: New species of the nemerteans associated with *Galatheanthemum* sp.; 2 – new species of the family Korotkevitschiidae (photos by A. Maiorova).

7.30. Sipunculans and echiurans distribution in KURAMBIO II

A. S. Maiorova

7.30.1. Objectives and background

Sipunculans, or peanut worms (Fig. 92), constitute a well distinguished monophyletic group of exclusively marine non-segmented coelomate worms. Sipuncula were long considered a phylum, but are now more commonly included in the phylum Annelida based on phylogenetic and phylogenomic analyses (e.g. Struck et al. 2011). Whereas Stephen and Edmonds (1972) recognized approximately 320 species of sipunculans, Cutler (1994) later synonymized many of the species and reduced the number to roughly 150.This practice of taxonomic “lumping” may contribute to even larger reported distributions for individual species.

Sipunculans are theoretically good models for examining the relationship between dispersal capabilities, species ranges and population connectivity because of their wide distribution ranges and because they can relatively easily be collected in sufficient numbers for population-level studies. We therefore aimed to sample these taxa and study their distribution at abyssal and hadal depths.

7.30.2. Work at sea

Sipunculands and echiurans were samples with all gear and later identified to species level in the laboratory.

7.30.3. Preliminary results

About 30 species of sipunculans were found in the abyssal depth (below 3000 m). Some eurybathic species are found between 10 to 4000 m over a wide range of temperatures but some species are restricted to cold water deeper than 3000 m and never found above this isobath. At least 13 species are known from the depth below 5000 m.

Some species are common even at the ultraabyssal depth (more than 6000 m) (*Golfingia muricaudata*, *G. anderssoni*, *Phascolion lutense*, *P. pacificum*), but it should be emphasized that the ultraabyssal zone has no endemic species.

During the expedition sipunculans have been collected at almost each station below 6500 m into all gears samples (beside multinet). Almost 550 specimens from sorted samples have been identified to genus or species levels. Only five species from three genera have been found. Three sipunculans species: *Golfingia muricaudata*, *Phascolion lutense* and *Nephasoma diaphanes* were the most widely distributed and abundant. The other two species were abundant only at few stations (*Nephasoma corrugatum* at area A8 and *Phascolion pacificum* at area A2). Sipunculans *P. pacificum* were always occupying forameniferan tubes, while *P. lutense* had its own tubes composed of cuticles and mud. For further morphological and genetic analysis of specimens all sipunculan species were fixed in both, formaldehyde and ethanol. Morphological analysis will include comparison of cuticle structures together with inside characters. Unfortunally, the most useful character of sipnculans, the head morphology, cannot be used for the deep-sea species and only including of genetic analysis may shade light to the true species distribution and population structure.

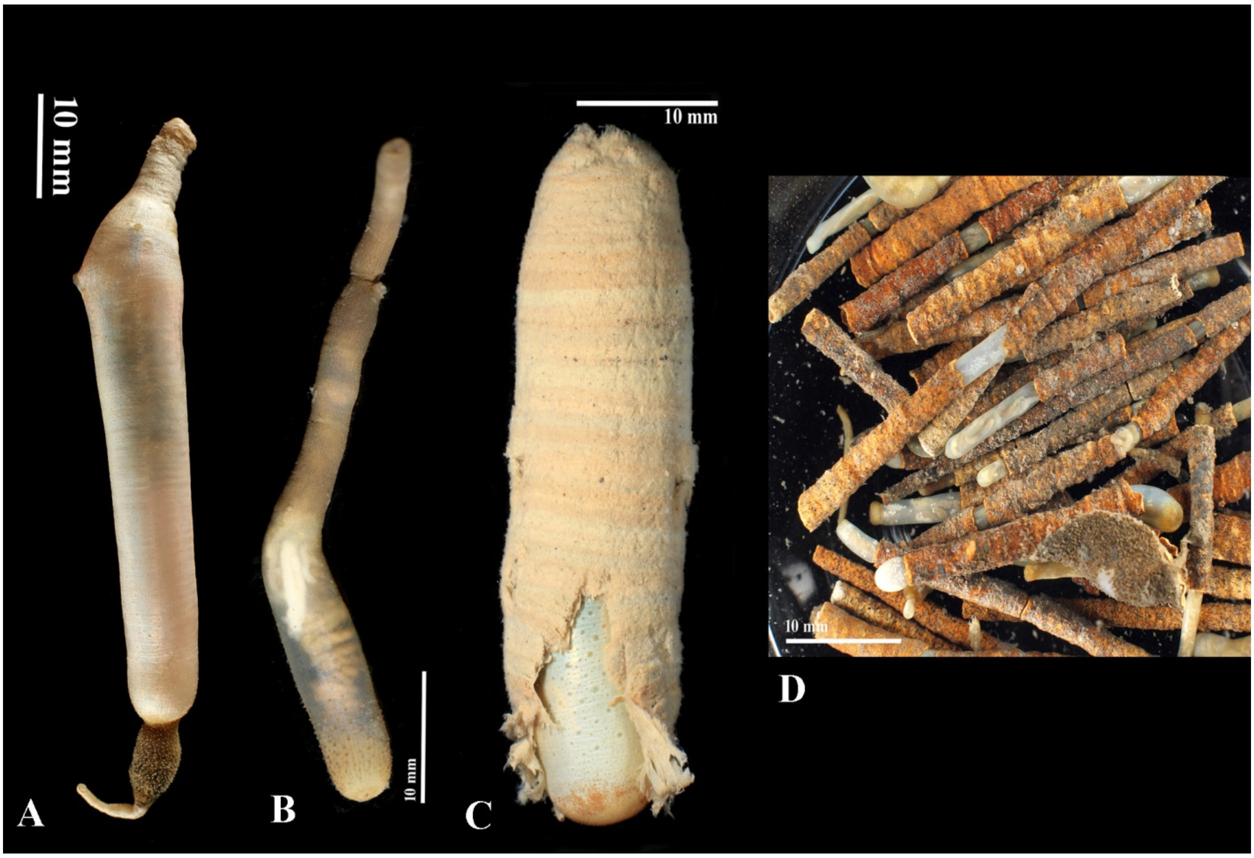

Figure 92: A. *Golfingia muricaudata*. B. *Nephasoma corrugatum*. *C. Phascolion lutense*. *D. P. pacificum* in forameniferan tubes.

Echiura (spoon worms) (Fig. 93) is a group of marine worms that have a sausage-shaped body with an extensible scoop-like proboscis. Approximately 165–195 species of echiurans have been recorded (Biseswar, 2012). They always live in protected places and are well adapted for living in burrows.

Echiurans occur widely and their bathymetric range is extensive. They are well known in tropical, temperate and polar waters and are collected from the littoral to the abyssal regions of the ocean. All species collected during KURAMBIO II expedition belong to the family Bonellidae. Previously bonellids have been dredged from depths of 6000-10000 m (Zenkevitch, 1958; 1966).

Zenkevitch considered that the Bonellidae are a characteristic community of the abyssal and ultra-abyssal fauna and reach to the greatest depths of the ocean (Zenkevitch, 1966)

Not less than six species from six genera of echiurans have been collected during KURAMBIO II expedition at various depths from 5200-9500m. The most abundant species collected at depths 6200-8100m are *Alomasoma sp*., *Ikedella sp*., *Jakobia birsteini*, *Protobonellia zenkevitchi*, whereas *Vitjazema ultraabyssalis* was collected only from 8700 m to 9500m. Only one species (*Bonellia sp*.) have been found at depth 5200. The density of *V. ultraabyssalis* was up to five specimens per 0.25 m^2 at some deep sea stations (see sta#105). For further morphological and genetic analysis of specimens all echiurans were fixed in both, formaldehyde and ethanol. Morphological analysis will include comparison of proboscis fine morphology together with inside characters (nephridium, anal vesicles). All collected specimens were females; males were not observed. With the fine morphology of the proboscises it may be possible to discuss further the type of echiuran's feeding.

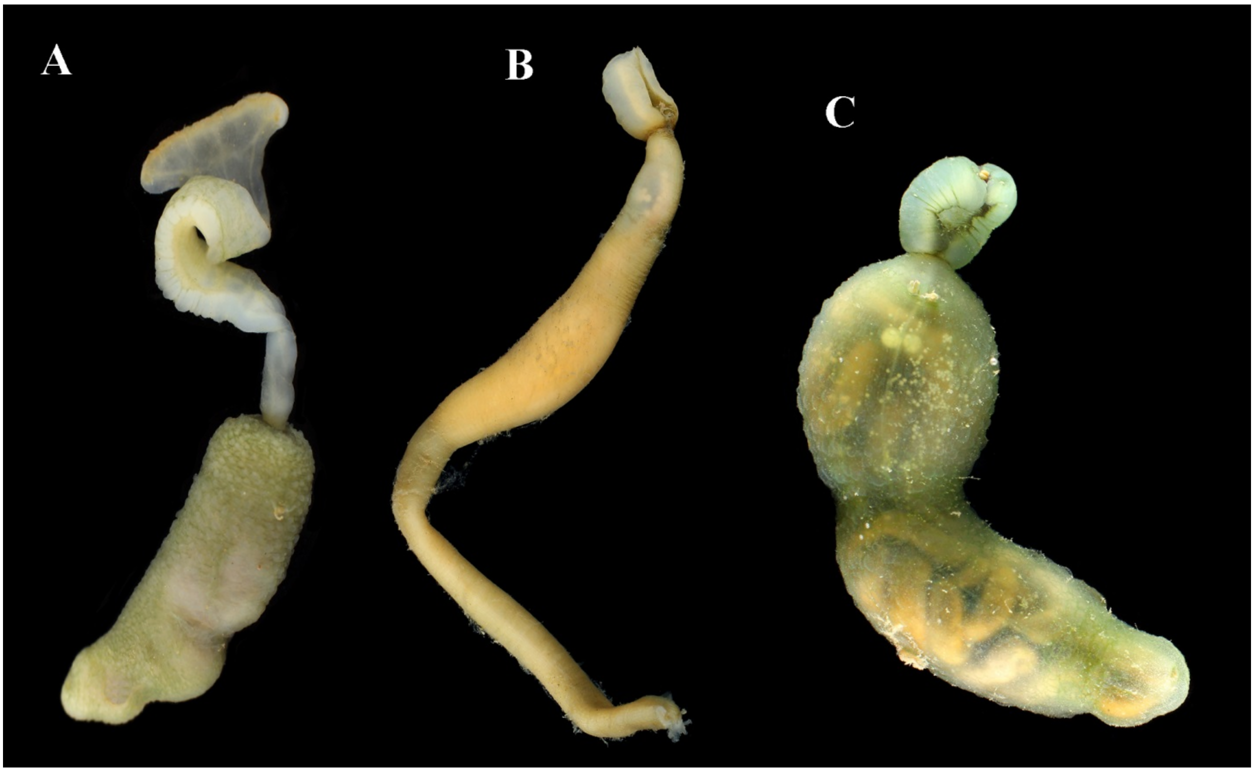

Figure 93: A. *Alomasoma* sp.; B. *Ikedella* sp.; C. *Vitjazema ultraabyssalis*.

7.31. Mega- and macrofauna sampling using the Agassiz Trawl during the KuramBio II (KurilKamchatka Biodiversity Studies II) expedition

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7.31.1. Objectives

During the KuramBio II Expedition, the Agassiz Trawl (AGT) was utilised to catch primarily mega- and macrofaunal organisms. All organisms collected during this expedition will be identified by German, Russian and Japanese taxonomic specialists. Selected taxa were also subsampled for genetic and biochemical analyses.

7.31.2. Work at sea

The AGT used within the KuramBio II Expedition was of a standard design with frame dimensions of 350 cm x 70 cm (width x height) and a mesh size of 10 mm. For the deployment at stations 54, 56, 78, 86, 90 and 98, a 50 cm long fine mesh (500 µm) were put in the cod end of the net to catch smaller animals. In general, the AGT was deployed twice at each area; however, areas A2, A3, A7, A9, A10 and A11 had only one AGT deployment. At area A10 AGT was damaged during the first deployment (St. 86) due to a rocky bottom. As the gear needed to be repaired, the second deployment at this station was cancelled. At other areas AGT was deployed only once due to a time limitations (Table 25). Each of the 16 AGT stations (deployments) were successful (sample retrieved).

All the AGT samples contained varying amounts of sediment and/or stones (Table 26, Fig. 94). As soon as the sample arrived on deck, a picture of the complete sample was taken and all visible and fragile animals were removed from the catch. After this initial step, the team started sieving the sediment. For 100 l volume of sediment two fractions were retrieved: 1 mm and 300 µm. Rest of the catch was sieved only through a 1 mm sieve. At stations 9, 18, 20, 31, 56 and 64 due to a small volume of sediment both fractions were retrieved for the whole catch. During the sieving larger organisms were removed and stored in cooled seawater until further treatment. Sieved material was immediately taken to the laboratory, where it was placed on ice in cooled seawater and immediately sorted. The organisms were classified according to higher taxon leveland sorted in different trays. At this point, subsamples for biochemical analyses and for DNA extraction were taken from selected taxa. As soon as sieving was completed, specialists on each of the different taxonomic groups started to compile their samples. All samples were preserved in either buffered formalin-seawater (4%) or ethanol (96%) and stored at ambient temperature (formalin samples) or -20°C (ethanol samples). In parallel with the preservation process, the most interesting taxa, or best preserved ones, were photographed by Anastassia Maiorova and Anna Lavrentyeva (EBS team).

Table 25: Station data of AGT deployments. Red colour indicates unclear “On Ground” and “From Ground” events.

Area	Station	Position On Ground		Position From Ground		Depth at On Ground [m]:	Depth at From Ground [m]:	Calculated trawled distance [m]	Date
		Latitude N	Longitude E	Latitude N	Longitude E				
A8	7	43° 49,814' N	151° 44,787' E	43° 48,076' N	151° 45,255' E	5210,1	5103,3	1440	18.08.2016
	9	**43° 48,439' N**	**151° 44,351' E**	43° 47,643' N	151° 44,513' E	5134,2	5101,5	1518	19.08.2016
A1	18	45° 50,861' N	153° 49,568' E	45° 51,954' N	153° 51,259' E	8200,3	8185,2	1825	22.08.2016
	20	**45° 51,327' N**	**153° 50,083' E**	45° 52,203' N	153° 51,435' E	8191,4	8199,3	2571	23.08.2016
A6	29	45° 56,731' N	152° 52,545' E	45° 56,570' N	152° 54,499' E	6183,1	6202,2	2180	26.08.2016
	31	45° 56,688' N	152° 52,785' E	45° 56,544' N	152° 54,667' E	6184,5	6220,6	2224	27.08.2016
A5	41	45° 39,232' N	152° 56,687' E	45° 40,114' N	152° 58,366' E	7154,4	7163,9	2219	29.08.2016
	43	45° 38,514' N	152° 56,775' E	45° 39,358' N	152° 58,377' E	7241,1	7245,4	2592	30.08.2016
A4	54	45° 28,502' N	153° 11,539' E	45° 28,125' N	153° 10,109' E	8728,9	8734,8	1710	06.09.2016
	56	45° 29,630' N	153° 12,028' E	45° 30,086' N	153° 10,369' E	8725,9	8403,8	1934	07.09.2016
A3	64	45° 9,388' N	153° 44,966' E	45° 9,991' N	153° 46,626' E	5738,6	5726,1	1880	09.09.2016
A7	78	45° 13,979' N	152° 48,980' E	45° 14,482' N	152° 47,736' E	9581,7	9581,3	1272	13.09.2016
A10	86	45° 0,435' N	151° 6,010' E	**45° 1,371' N**	**151° 6,001' E**	5493,4	5529,5	2000	15.09.2016
A9	90	44° 40,950' N	151° 27,347' E	44° 41,992' N	151° 26,321' E	8254,6	8272,9	2398	17.09.2016
A2	98	44° 5,538' N	151° 24,258' E	44° 6,253' N	151° 25,935' E	6445,6	6442,1	2280	19.09.2016
A11	103	44° 12,499' N	150° 39,035' E	44° 12,502' N	150° 37,258' E	9292,9	9430,8	695	21.09.2016

Table 26: Sediment descriptions of all AGT catches.

Station	Sediment content
7	brown soft sediment
9	brown soft sediment
18	gravel, grey silt, fine sand
20	brown soft sediment, pieces of hard blue clay
29	brown soft sediment
31	almost no sediment, a few pieces of blue clay
41	pieces of hard clay
43	large and medium-sized stones, gravel, small amount of brown soft sediment
54	brown soft sediment
56	almost no sediment
64	almost no sediment
78	brown soft sediment, pieces of hard blue clay
86	brown soft sediment, large stones
90	brown soft sediment with small amount of gravel
98	brown soft sediment with gravel

7.31.3. Preliminary results

Although some species from the AGT catches could be identified by specialists immediately after sorting, for the rest of taxa this was not possible. Due to this, the preliminary data on macro- and megabenthic faunal composition was presented here at macrotaxa level (Table 27, Fig. 95). The data on station 103 (Area A11) was not included here as the samples from that station were still not processed completely at the time of writing the report.

The AGT stations taken within one area often differed in abundance and taxonomic richness (Table 30). Most likely this was due to a different behaviour of the gear or a patch-like distribution known for a certain taxa (i.e. holothurians).

AGT catches at deepest areas sampled (A4, A7 and A9) were characterized by highest abundance of macro- and megafaunal animals (both in absolute numbers and in numbers per 1 km of trawling distance). Samples from shallower depths usually had smaller numbers of animals.

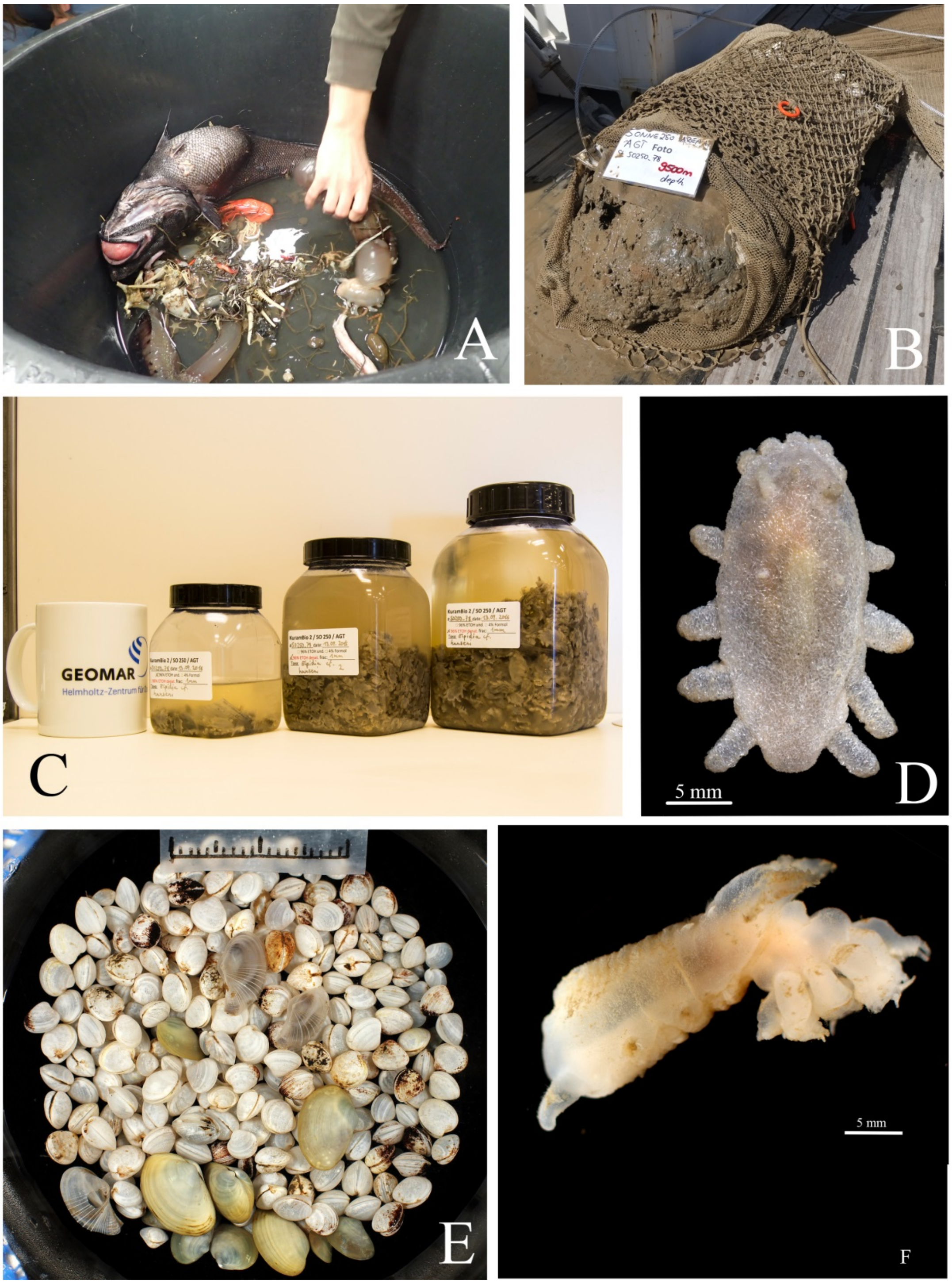


Fig. 94: AGT samples in KuramBio II expedition. A - well washed trawl catch at St. 64; B - trawl catch from deepest station 78, containing lots of sediment; C, D – *Elpidia hanseni* from St. 78; E – *Vesicomya* sp. (most abundant) and other bivalves from St.89 at area A9. F – *Peniagone* sp. from St. 29.

In all AGT samples, the dominant macro- and megafaunal taxa were polychaetes, holothurians and bivalve molluscs. At different stations these faunal groups were found in different proportions but mostly these occured in significant numbers. In general, polychaetes were more abundant at shallower depths and bivalves dominated at deepest stations. Holothurians were equally well represented at all depths. High numbers of crustaceans, recorded for areas A8, A9 and A10, were mainly due to the numerous small harpacticoid copepods and ostracods found in a 300 µm fraction of trawl catches. Therefore, the dominant macrofaunal taxa at these stations were holothurians (A8 and A10) and bivalves (A9). The only area where macrobenthic crustaceans appeared in significant numbers, was A5. Both stations from this area were characterized by isopod crustations as one of the dominant taxa.

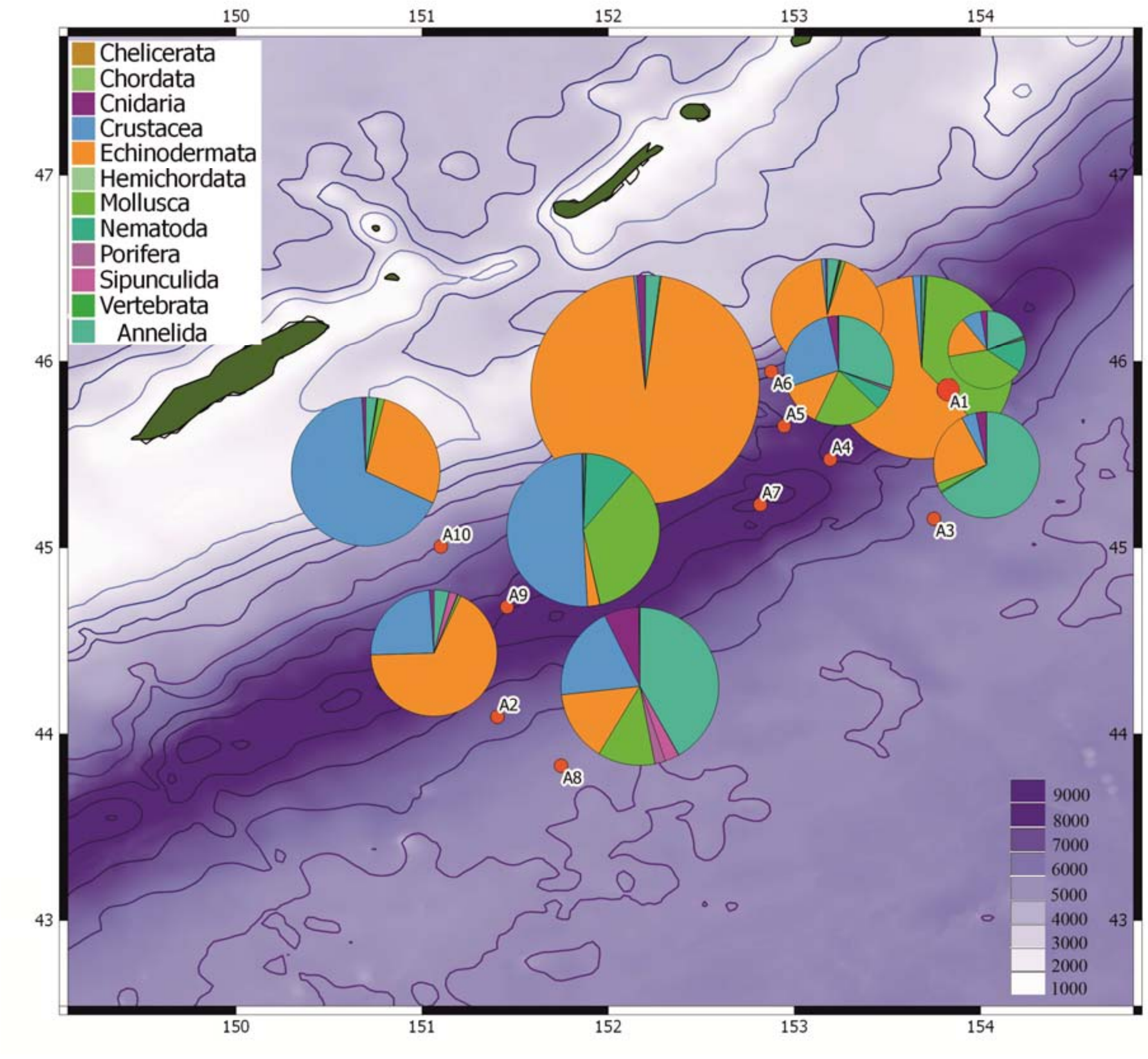


Fig. 95: Macrotaxa composition and abundance in AGT samples. Size of pie chart corresponds to average number of specimens per 1 km of trawling distance.

Considering all current faunal AGT data from the cruise, the shallower stations (areas A3, A8 and A10) was characterized by the taxonomically richest fauna. Most of the deeper hadal stations taken within the Kuril-Kamchatka trench were characterized by dominance of a few key taxa and lower overall taxonomic diversity. This type of mega- and microbenthic taxa composition was most prominent at areas A4, A7 and A9, located below 8000 m depth. In the deepest areas A4 and A7, holothurians of one species (*Elpidia hanseni*) accounted for a 55% and 88% (respectively) of all specimens obtained. Other 36% of specimens collected at area A4 belonged to a bivalve species Vesicomya sp. (Fig. 92). At area A9 these bivalves accounted for 51% of all specimens obtained. These results correspond with the opinion of Belyaev (1966), who mentioned upper hadal (6000 – 7000 m) as a barrier for further depth colonization, probably, due to a limited ability of most taxonomic groups to tolerate higher pressure levels.

It is also worth mentioning a community found at abyssal depths off the western slope of Kuril-Kamchatka trench (areas A6 and A10), characterized by dominance of bentho-pelagic holothurians *Peniagone* sp. (Fig 94).

These are only the preliminary results based on a low level of taxonomic resolution; more specific and interesting conclusions will be published in the future after the samples have been processed by taxonomists in order to gain species-level identifications for the entire expedition.

Table 27: Full preliminary macrotaxon list for AGT stations (except St. 103).

Area		A8		A1		A6		A5		A4		A3	A7	A10	A9	A2	Total N of speciemns
Station		7	9	18	20	29	31	41	43	54	56	64	78	86	90	98	
Annelida	Polychaeta	425	144	4	43		36	76	230	8		214	14	11	60		1265
	Pogonophora											50	10	7	3	14	84
	Echiura				3			1	30	5			2	2	1	2	46
Bryozoa	Bryozoa	4							1								5
Chelicerata	Pycnogonida	1	2					1									4
	Acarina							1									1
Chordata	Tunicata							1									1
Cnidaria	Anthozoa	30	55	5	3	2			36			13	15	7	1	4	171
	Hydrozoa		11	6		1	3			1	2				2	9	35
	Scyphozoa	4															4
Crustacea	Copepoda				2				21		4	2		303	271	9	612
	Ostracoda	1	209		5									42	16	251	524
	Isopoda	17	14	12	3	6		28	144	1				97	132	44	498
	Tanaidacea	12	7		3			9	9					102	51	2	195
	Amphipoda	7		1	21	6		9	39	13			3	9	35	25	168
	Mysida	1	1						42					2			46
	Decapoda		2		2				2	2	14	15	2			1	40
	Cumacea	1												4			5
	Euphausiacea								1								1
	Dendrogastrida											1					1
Echinodermata	Holothuroidea	41	62	67	15	99	755	25	115	1293	16	5	1129	205	26	39	3892
	Asteroidea	11	14			35	78	2				8		4		15	167
	Ophiuroidea	9	28			5	5					78		21		11	157
	Crinoidea							1	1			1	72	1			76
	Echinoidea	21	17	3												1	42
	Myriotrochidae						1										1
Hemichordata	Enteropneusta														1		1
Mollusca	Bivalvia	29	10	24	203	5		14	193	782	1	6		2	351		1620
	Gastropoda	70	17	1	1	2	4	1	18	11		3	2	10		6	146
	Scaphopoda	20	14														34
	Aplacophora			1	12			1	3								17
	Cephalopoda			1								1					2
	Pteropoda					1											1
Nematoda	Nematoda				92			1	71					1	106		271
Porifera	Porifera	17	13		5	2	1	2	7	1				1		1	50
Sipunculida	Sipunculidea	30	10			3										29	72
Vertebrata	Pisces		1	3		1			1	3	3	2			2	1	17
Total N of speciemns		751	631	128	413	168	883	173	964	2120	40	399	1249	831	1058	464	10272

7.32. Deep-sea ichthyofauna of the Kuril-Kamchatka trench, obtained in KuramBio II Expedition from AGT samples

G. Shinohara

7.32.1. Objectives

Aim of this study was to improve the knowledge on ichthyofauna of Kuril-Kamchatka trench region with a special attention to insufficiently studied hadal depths.

7.32.2. Work at sea

Fishes were directly picked from AGT catches during the sieving. Each specimen was photographed and then fixed with 4% formalin (small specimens) or freezed in -20°C (large specimens).

7.32.3. Preliminary results

In total, 13 specimens belonging to 3 families were retrieved from AGT samples:

St. 9: *Coryphaenoides acrolepis*, 1 specimen (Gadiformes, Macrouridae; benthopelagic)

St. 18: *Cyclothone* sp., 1 specimen (Stomiiformes, Gonostomatidae; mesopelagic)

Coryphaenoides acrolepis, 2 specimens

St. 54: Myctophidae sp., 2 specimens (Myctophiformes, Myctophidae; mesopelagic)

Coryphaenoides acrolepis, 1 specimen

St. 56: *Stenobrachius* sp. (Myctophiformes, Myctophidae; mesopelagic)

Coryphaenoides acrolepis, 2 specimens

St. 64: *Coryphaenoides acrolepis*, 2 specimens

St. 90: Macrouridae sp. (Gadiformes, Macrouridae; benthopelagic; 85 mm in total length, juvenile or young)

7.32.4. Remarks

Coryphaenoides acrolepis

Seven large specimens (700-850 mm in total length) were totally captured from Stations 9, 18, 54, 56 and 64 (Fig. 96). It had been recorded from the bottom of 300-3700 m on the continental slope (Nakabo and Kai, 2013). This species was collected by the bottom trawls deployed at 5134.2-8728.9 m depths in KKT, making the depth records for the species wider than recorded previously. But further examination of these KKT specimens is needed to decide their captured depths because *C. acrolepis* sometimes appears off the slope bottoms into mid-waters (Cohen et al., 1990). With additional evidence regarding to their catch not in mid-waters but on bottom, the specimen(s) from the Station 54 (1 specimen, 8728.9 m) or Station 56 (2 specimens, 8725.9 m) indicate the world deepest record for the fishes because *Abyssobrotula galatheae* (Ophidiidae) was collected from 8370 m in Puerto-Rico Trench (Nielsen, 1977). Besides, *Careproctus amblystomopsis* (Liparidae) holds the deepest record as 7210-7230 m from the KKT (Andriashev and Pitruk, 1993).

Fig. 96: *Coryphaenoides acrolepis* from St. 54.

7.33. Ophiuroids

A. Eichsteller, P. Martinez Arbizu, N. F. Mercado Salas, K. Minin

7.33.1. Objectives

We are interested in the distribution of the Ophiuroids in the Kurilen-Kamtschatka Trench.

7.33.2. Work at sea

15 species of ppiuroids (Fig. 97) were caught with the AGT and the EBS. After the first fixation in undenatured ethanol we took pictures of each specimen. Figure 98 shows the 4 most abundant morphospecies. From each specimen we cut an arm and put the specimen in a bag and the arm in a vial as a voucher. Both were fixed in ethanol again and labelled by the same collection number. We did a DNA-Extraction of a small (2mm) tissue sample and amplified the mitochondrial gen CO1. The success of the amplification was tested on a 1.5% agarose gel using an electrophoresis machine. The success rate of the amplification was nearly 100%, but some bands were not so bright.

7.33.3. Preliminary results Ophiuroids

We found 201 specimens of Ophiuroids belonging to 15 different morphospecies (Fig. 97).

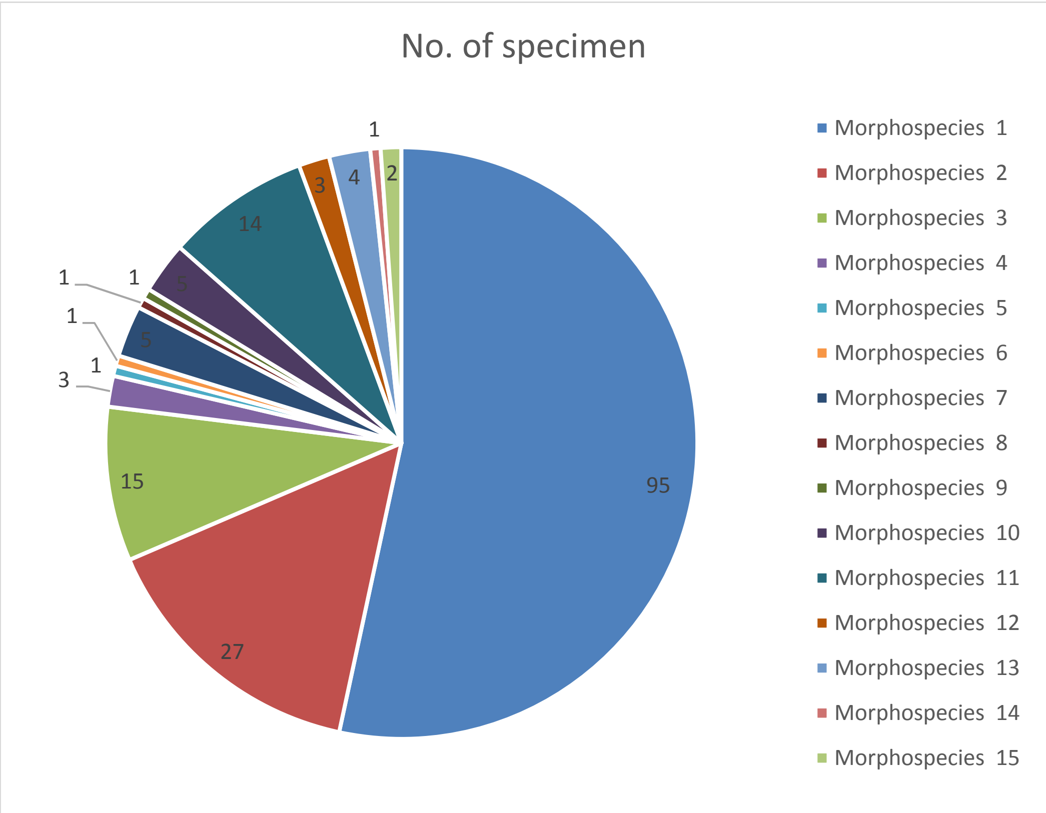
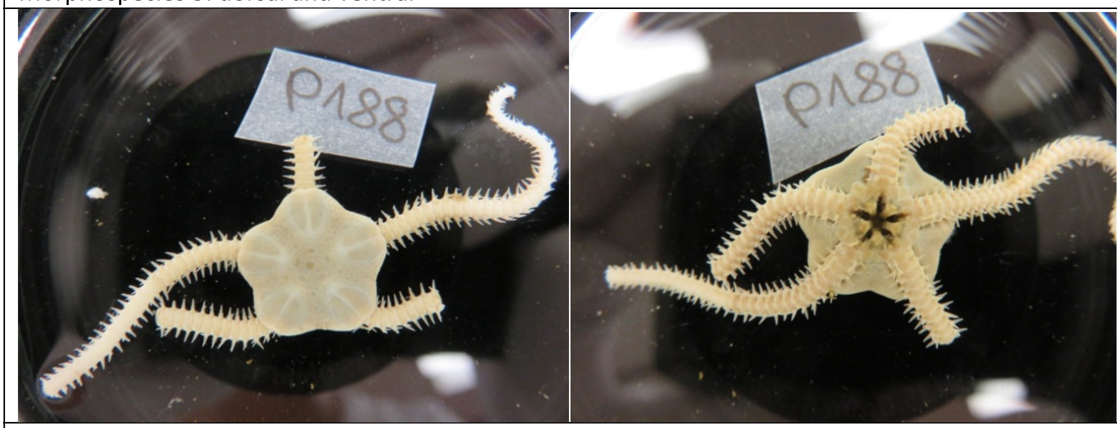


Fig. 97: Number of specimens.

Morphospecies 1: dorsal and ventral

Morphospecies 2: dorsal and ventral

Morphospecies 3: dorsal and ventral



Morphospecies 11: dorsal and ventral

Fig. 98: The four most abundant species.

7.33.4. Future plans

After sequencing by an extern company, we will compare the sequences and do a species delimitation analysis in order to discriminate how many species we have in the collection. With the most common species we will perform a haplotype diversity analysis.

7.34. Porifera

Melanie Fuchs

7.34.1. Preliminary results

In total 84 sponge specimens were collected. Apart from the AGT, sponges were also obtained with the gears EBS, MUC and Box corer (only one specimen per the MUC and the box corer). The collected sponge samples represent 24 morphotypes of the two classes Hexactinellida (glass sponges) and Demospongiae. Hexactinellida are dominating in number of specimens but are represented by four morphotypes only. Within the Demospongiae the family Cladorhizidae is well represented with 31 specimens. This family is characterized by a carnivorous feeding regime and is typically deep-sea dwelling (van Soest et al. 2012). Diversity within the collected cladorhizid sponges appears to be high with 18 morphotypes obtained. The depth record for sponges up to date is 8840 m held by the species *Asbestopluma occidentalis* (Koltun 1970). This record has been broken on this cruise by several specimens, which were retrieved from depths below 9000 m. The specimens remain to be identified. Species identification trough spicule extraction was not carried out on board due to space limitations and will instead be done at the Forschungsinstitut und Naturmuseum Senckenberg Frankfurt am Main, where an SEM is available for spicule analysis. Preliminary results for each station from which sponge samples were retrieved are listed below:

Area 1 (Station 17) Demospongiae: 1 specimen.

Area 2 (Station 20) Family Cladorhizidae: 4 specimens; Hexactinellida: 1 specimen.

Area 3 (Station 52) Family Cladorhizidae: 2 specimens; Station 53: Cladorhizidae: 1 specimen.

Area 5 (Station 41) Family Cladorhizidae: 1 specimen; Station 43: Cladorhizidae: 6 specimens; Hexactinellida: 1 specimen.

Area 6 (Station 28) Hexactinellida: 1 specimen; Station 29: Hexactinellida: 2 specimens; Station 31: Hexactinellida: 1 specimen.

Area 8 (Station 6) Family Cladorhizidae: 2 specimens; Station 7, Demospongiae: 5 specimens.

Family Cladorhizidae: 3 specimens; Hexactinellida: 8 specimens; Station 8: Family Cladorhizidae: 2 specimens; Hexactinellida: 2 specimens; Station 9: Demospongiae: 9 specimens; Family Cladorhizidae: 3 specimens; Hexactinellida: 19 specimens; Station 10: Family Cladorhizidae: 7 specimens; Hexactinellida: 2 specimens.

Area 10 (Station 85) Hexactinellida: 1 specimen; Station 86: Hexactinellida: 1 specimen

Fig. 99: cf. *Asbestopluma* sp. New depth record for Porifera: 9013 m, Station A4-53 (MUC), scale: 1mm.

7.35. Study of the trophic relationships of benthic megafauna (AGT) using stable isotope and fatty acid trophic markers

Vladimir Kharlamenko

7.35.1. Objectives

Studies of trophic relationships are very important to our understanding of ecosystems. The main goal of this study was to reveal the trophic relationships in the abyssal food web of Kurile-Kamchatka Trench. Vertical changes in the main feeding groupings of bottom-living fauna and the gut content of many abyssal animals of Kurile-Kamchatka Trench were studied (Sokolova, 1986). However, the study of abyssal species' diets is difficult, partially because some deep-water invertebrates are capable of surviving prolonged starvation, and may regurgitate ingested food upon lifting by trawl (Sokolova 1986). Alternative methods have been established to study trophic relationships in deep-sea ecosystems, such as the analysis of stable carbon and nitrogen isotopes or the fatty acid composition of consumers.

7.35.2. Work at sea

For these analyses we sub-sampled AGT samples and chose 981 individuals from the 69 most abundant species. Many of them were collected from the hadal zone. Numbers and systematic position of sampled invertebrates are presented in Table 1. Additionally, 12 species (2996 ind.), which are potential food sources for megafauna were sampled using EBS and MNN.

7.35.3. Preliminary results

From 16 collected species of Polychaeta 13 were not studied before. 10 of 12 Echiuroidea species and all sampled species of Nematoda, Bivalvia, Crinoidea, Pogonophora and Ascidiae were not studied before. Filter feeding bathycrinid crinoids, which are unusual for hadal depth, were collected. The thyasirid bivalve *Maorithyas hadalis* was found in chemosynthetic-based communities on 7326 m in the Japan Trench (Fujikura et al., 1999). We collected one species of family Thyasiridae from depth 9311 m and we proposed this bivalve feeds on chemosynthetic bacteria.

Among potential food sources Pheodaria were collected. They are an important component of plankton and potential food source for hadal invertebrates (Vinogradov, 1970) and many species of benthic Foraminifera (Figs. 100, 101). As we found before, foraminiferan lipids contain many unusual fatty acids, which can be used as trophic markers. Most abundant invertebrates were sampled from hadal zone - bivalves *Vesicomya pacifica* and *Yoldiella ultraabyssalis,* holothurians *Elpidia hanseni* and echiuroid *Vitjazema ultraabyssalis.*

For the isotopic analysis, muscle tissues were sampled from molluscs, the body wall from holothuroids, echiuroids, big sipunculoids, the arm fragments were sampled from ophiuroids, and individuals without intestines were taken from crustaceans, polychaetes and ascidians. The individuals of all invertebrates species sampled onboard were adults of the same size class. For fatty acid analysis, animals were dissected on board after collection, and the body wall (holothurians, echiuroids, big sipunculoids), gut wall (echinoids), or whole individuals (bivalves, ophiuroids) were taken. Samples were placed in vials immediately after collection and stored at −80°C. Final analysis of sampled material will be done in the Laboratory of Comparative biochemistry of the Institute of Marine Biology FEB RAS and Stable Isotope Laboratory of the Far Eastern Geological Institute FEB RAS (Vladivostok, Russia) according to the procedure described by Kiyashko et al. (2014).

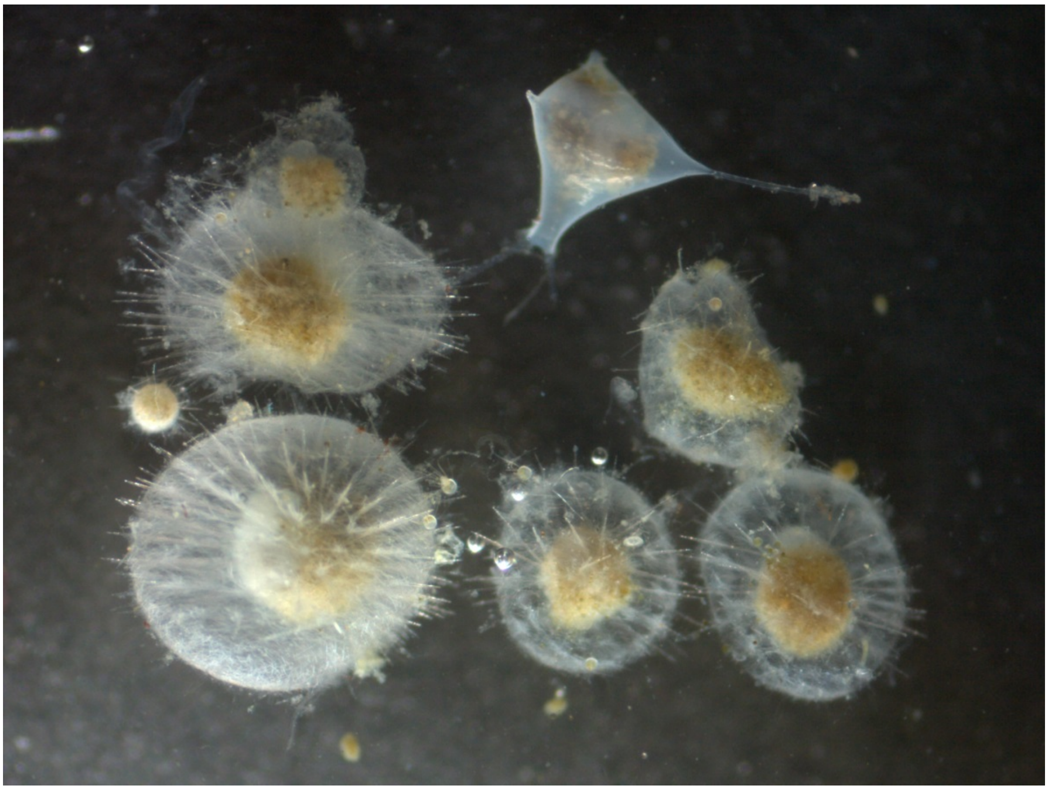


Figure 100: *Phaeodaria* from the depth 3000-5000 m.

Table 28: Numbers and systematic position of invertebrates sampled for stable isotopic and fatty acids analysis.

Taxon	№ species	Station												
		A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	A11	∑ ind.	∑ind. from hadal zone
Foraminifera	11	739	0	1600	60	34	0	0	60	166	15	170	2844	1169
Phaeodaria	1	15	20	0	0	0	15	0	70	0	32	0	152	0
Spongia	3	0	0	0	0	0	0	0	3	0	0	0	3	0
Ctenophora	5		0	0	0	0	0	0	0	0	0	11	11	0
Polychaeta	16	11	0	0	0	3	43	31	25	3	60	38	214	99
Echiuroidea	12	4	0	0	5	1	3	3	5	0	0	4	25	20
Sipuncula	2	0	0	0	0	0	3	0	0	0	7	0	10	3
Nematoda	3	3	0	0	0	114	0	0	0	0	0	0	117	117
Isopoda	1	0	0	0	0	5	0	0	0	0	0	0	5	5
Bivalvia	9	65	0	0	43	27	3	0	6	50	0	194	388	230
Gastropoda	1	1	0	0	0	0	0	0	0	0	0	0	1	1
Echinoidea	2	0	0	0	0	0	0	0	4	0	0	0	4	0
Asteroidea	3	0	3	0	0	0	3	0	4	0	0	0	10	6
Crinoidea	1	0	0	0	0	0	0	12	0	0	0	0	12	12
Ophiuroidea	1	0	0	0	0	0	0	0	0	0	4	0	4	0
Holothurioidea	11	6	3	1	20	5	10	3	5	0	7	5	65	52
Pogonophora 145	3	0	0	50	0	0	0	0	0	0	22	50	122	0
Ascidiae	1	0	0	0	0	4	0	0	0	0	0	0	4	4
∑	86	844	26	1651	128	193	80	49	182	219	147	461	3991	1718

Figure 101: Benthic foraminifera *Hippocrepinella* sp. from the station A10.

7.36. Foto and video documentation and abiotic parameters of selected stations

N. Brenke

One of the two epibenthic sledges (C-EBS) used in the KuramBio II expedition is equipped with two camera systems and furthermore a Seaguard CTD/RCM with sensors for temperature, salinity, O_2 concentration and pressure. The working range is limited to 6000 m (respectively 600 bar) (Brandt et al. 2013). Hence, for five stations of this expedition we measured the O_2 concentration and the temperature during the deployment.

Table 29: Preliminary abiotic data for the stations 8, 10, 65, 85 and 87 of the oxygen and the temperature. Mean bottom values are shown taken during the sledge was on the seafloor.

Sation	EBS No.	Area	Date(start)	depthmax	O^2Bottom	Temp Bottom
			UTC	[m]	[µM]	[°C]
So250_8	_1	A8	19.08.2016	5136	153.69	1.53
So250_10	_2	A8	19.08.2016	5120	153.56	1.53
So250_65	_11	A3	09.09.2016	5755	152.20	1.60
So250_85	_14	A10	15.09.2016	5265	154.75	1.47
So250_87	_15	A10	16.09.2016	5492	153.79	1.56

Table 30: Numbers of pictures and length of videos successfully taken during each haul of the C-EBS.

Sation	EBS No.	Area	Date(start) UTC	depthmax [m]	CCFilm [min]	CCFoto [n]	Stills Foto [n]
So250_8	_1	A8	19.08.2016	5136	30	58	(76)
So250_10	_2	A8	19.08.2016	5120	36	73	(61)
So250_65	_11	A3	09.09.2016	5755	43	(70)	428
So250_85	_14	A10	15.09.2016	5265	62	(97)	0
So250_87	_15	A10	16.09.2016	5492	44	214	4
		total			215	345	432

The visual documentation of the seafloor (Figs. 102-106) yielded a total of almost 777 pictures and about 215 minutes of video footage. Because the pressure cases of the lights, camera and camcorder are limited to a maximum depth of 6000 m all deployments in the Kurilen-Kamchatka Trench below this depth were conducted without cameras. Examples of the deep sea seafloor are given in the following pictures.

Fig. 102: The seafloor, approx. 2 m wide in front, of Station SO250_8 in 5136 m.

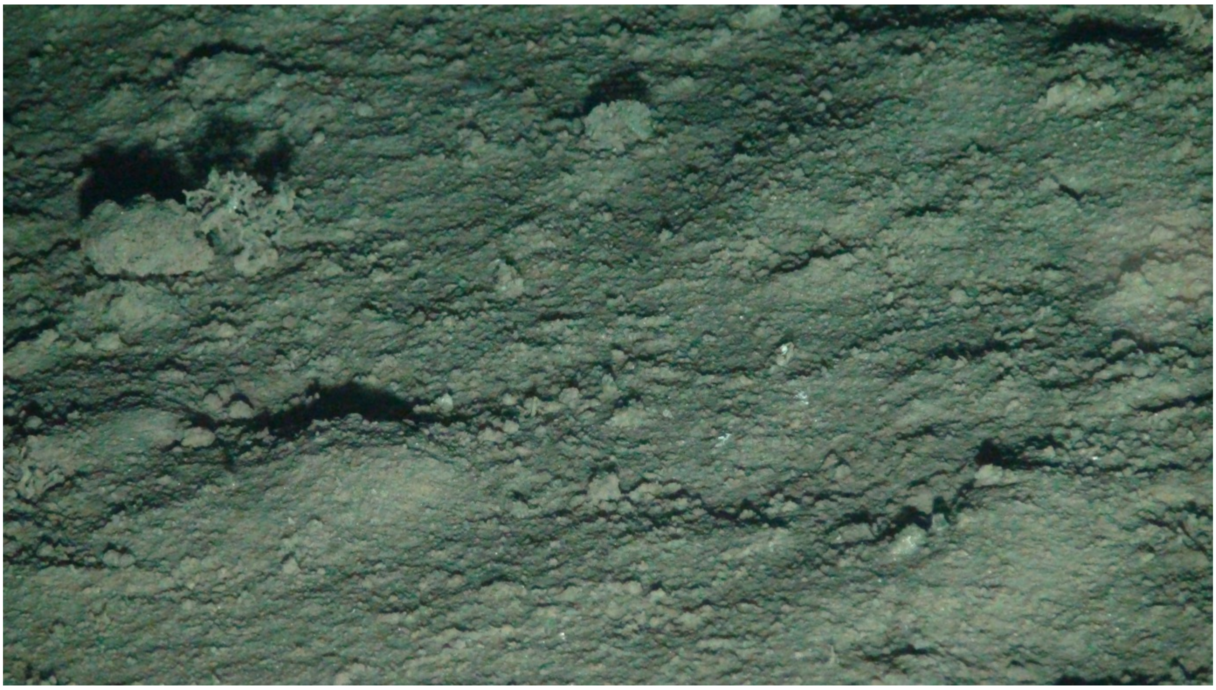


Fig. 103: The seafloor, approx. 40 cm wide in front, of Station SO250_10 in 5120 m.

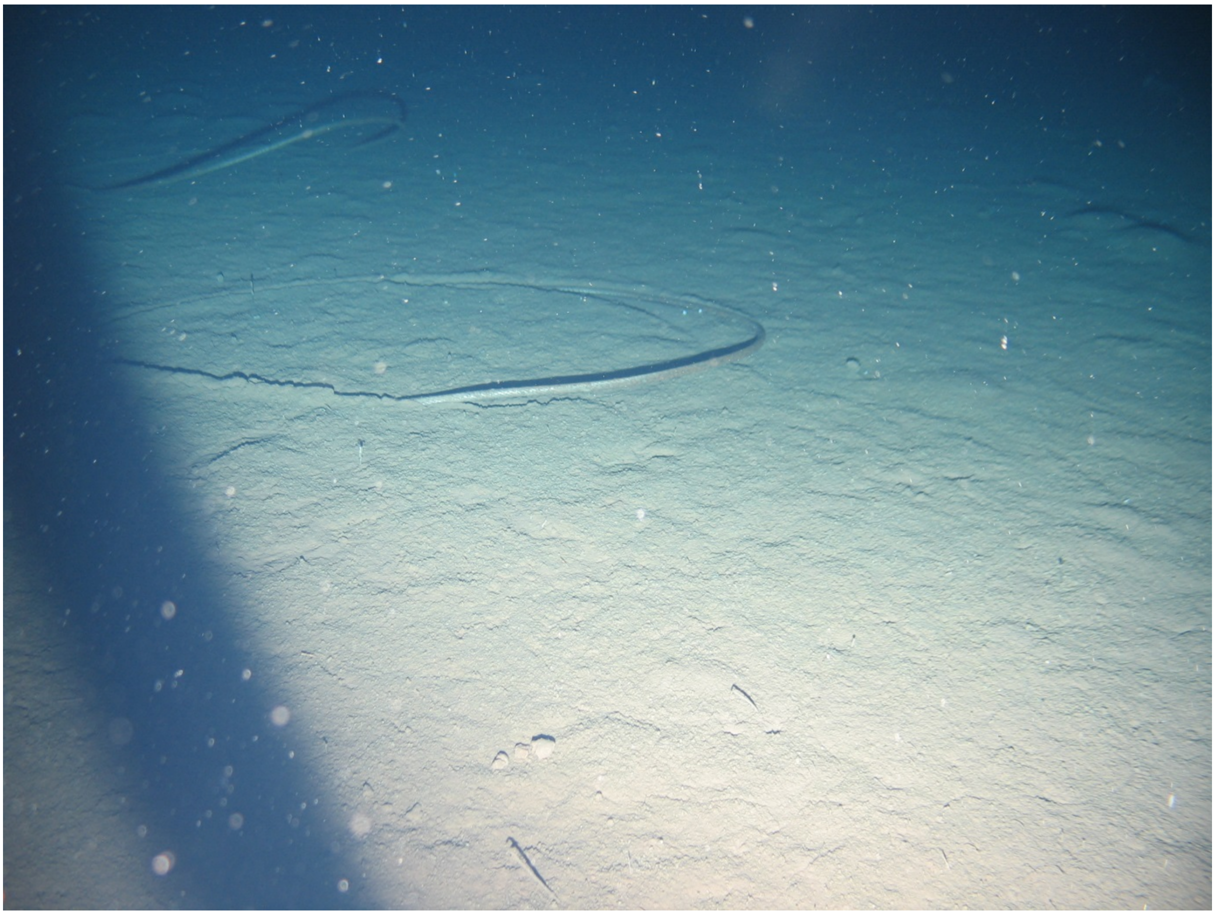


Fig. 104: The seafloor, approx. 2 m wide in front, of Station SO250_65 in 5775 m. In front of the EBS the towing cable is visible.

Fig. 105: The seafloor, approx. 2 m wide in front, of Station SO250_85 in 5265 m. Some traces of life are visible.

Fig. 106: The seafloor, approx. 1 m wide in front, of Station SO250_87 in 5492 m. It is assumed that the structures are Foraminiferans of the genus *Bathysiphon*. Hence, the animals form a "*Foraminiferan forest*" habitat.

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9. References / Literaturverzeichnis

Agassiz, A. (1880): Report of the Dredging Cruise of the U. S. Steamer Blake, Commander Bartlett, during the Summer of 1880. Science, 1: 314.

Alvaro, M.C., Błażewicz-Paszkowycz, M., Davey, N., Schiaparelli, S. (2011): Skin-digging tanaids: the unusual parasitic behavior of Exspina typica in Antarctic waters and worldwide deep basins. Antarctic Science, 23: 343–348. doi: 1017/S0954102011000186

Andrady, A.L. (2011): Microplastics in the marine environment. Marine Pollution Bulletin, 62: 1596–1605.

Andriashev, A.P. and Pitruk, D.L. (1993): Review of the ultra-abyssal (hadal) genus Pseudoliparis (Scorpaeniformes, Liparidae) with a description of a new species from the Japan Trench. Journal of Ichthyology, 33: 31–39.

Appeltans, W., Ahyong, S.T., Anderson, G., Angel, M.V., Artois, T., Bailly, N., Bamber, R., Barber, A., Bartsch, I., Berta, A. et al (2012): The magnitude of global marine biodiversity. Current Biology, 22: 1–14. doi: org/10.1016/j.cub.2012.09.036

Arseniev, V.S., Leontieva V.V. (1970): Water masses of the southern part of the Kurile-Kamchatka Trench during the summer of 1966. Fauna of the Fauna of the Kurile-Kamtschatka Trench and its Environment. Moscow. 86: 10–29.

Arts, M.T., Brett, M.T., Kainz, M.J. (2009): Lipids in aquatic ecosystems. Springer Dordrecht, Heidelberg.

Barnes, D.K., Galgani, F., Thompson, R.C., Barlaz, M. (2009): Accumulation and fragmentation of plastic debris in global environments. Philosophical Transactions of the Royal Society B: Biological Sciences, 364: 1985–1998.

Barnett, P.R.O., Watson, J., Connelly, D. (1984): A multiple corer for taking virtually undisturbed samples from shelf, bathyal and abyssal sediments. Oceanologica Acta, 7: 399–408.

Bednarsek, N., Feely, R.A., Reum, J.C.P., Peterson, B., Menkel, J., Alin, S.R., Hales, B. (2014): Limacina helicina shell dissolution as an indicator of declining habitat suitability owing to ocean acidification in the California Current Ecosystem. Philosophical Transactions of the Royal Society B: Biological Sciences, 281: 20140123.

Beliaev, G.M. (1966): Benthic fauna of the greatest depths (Ultra-abyssal) of the world Ocean. Nauka, Moscow, 247 p. [in Russian]

Beliaev, G.M. (1989): Deep-sea Ocean trenches and their fauna. Nauka, Moscow, 255 p. [in Russian]

Birstein, J.A. (1970): New Crustacea Isopoda from the Kurile-Kamschatka Trench area. In: Bogorov, V.G. (Ed.), Fauna of the Kurile–Kamchatka Trench and its Environment, Academy of Sciences of the USSR, vol. 86, pp. 308–356.

Birstein, J.A. (1971): Additions to the fauna of isopods (Crustacea, Isopoda) of the Kurile-Kamchatka Trench. Part II. Asellota 2. Akademiya Nauk, SSSR: Moscow (Fauna of the Kurile-Kamchatka Trench).

Birstein, J.A. (1961): Microthambema tenuis n. gen., n. sp. (Isopoda Asellota) and relations of some Asellote Isopods. Crustaceana, 2: 132–141.

Birstein, J.A. (1963): Deep water isopods (Crustacea, Isopoda) of the north-western part of the Pacific Ocean. Akademiya Nauk, SSSR: Moscow, pp. 1–213.

Birstein, J.A. (1970): New Crustacea Isopoda from the Kurile-Kamchatka Trench area. In: Bogorov, V.G. (Ed.), Fauna of the Kurile–Kamchatka Trench and its Environment, Academy of Sciences of the USSR, vol. 86, pp. 308–356.

Biseswar, R., (2012): Zoogeography of the echiuran fauna of the East Pacific Ocean (Phylum: Echiura). Zootaxa, 3479: 69–76.

Błażewicz-Paszkowycz, M., Bamber, R.N., Anderson, G. (2012): Diversity of Tanaidacea (Crustacea: Peracarida) in the World's Oceans – How far have we come? PLoS ONE, 7: e33068. doi:10.1371/journal.pone.0033068

Błażewicz-Paszkowycz, M., Bamber, R.N., Jóźwiak, P. (2013): Tanaidaceans (Crustacea: Peracarida) from the SoJaBio joint expedition in slope and deeper waters in the Sea of Japan. Deep-Sea Research Part II: Topological Studies in Oceanography, 86: 181–213.

Bober, S. (2014): Phylogenie und allgemeine Biologie von Tiefseeisopoden - Neue morphologische Daten. Talk, Hamburg, Germany.

Bober, S., Riehl, T., Brandt, A. (in preparation): New Macrostylidae (Crustacea, Isopoda) from the abyssal Northwest Pacific Basin described by means of integrative taxonomy.

Bober, S., Riehl, T., Brandt, A. (in preparation): An organ of equilibrium in deep-sea isopods revealed. The statocyst of Macrostylidae (Crustacea, Peracarida, Janiroidea).

Boxshall, G.A., Halsey, S.H. (2004): An introduction to Copepod diversity. Vol I & II. The Ray Society, London, 966 pp.

Brandt, A., Malyutina, M.V. (2015): The German–Russian deep-sea expedition KuramBio (Kurile Kamchatka biodiversity studies) on board of the RV Sonne in 2012 following the footsteps of the legendary expeditions with RV Vityaz. Deep-Sea Research Part II: Topological Studies in Oceanography, 111: 1–9.

Brandt, A. (1992): New Asellota from the Antarctic deep sea (Crustacea, Isopoda, Asellota), with descriptions of two new genera. Zoologica Scripta, 21: 57–78.

Brandt, A., Brenke, N., Elsner, N.O., Golovan, O.A., Lavrenteva, A.V., Malyutina, M.V., Riehl, T. (2012): Investigations of the epifaunal macrofauna using the camera-epibenthic sledge during the KuramBio (Kurile Kamchatka Biodiversity Study) expedition. In: The German-Russian deep-sea expedition KuramBio (Kurile Kamchatka Biodiversity Study), Brandt, A., Malyutina, M.V. (Eds.), Biocenter Grindel & Zoological Museum, University of Hamburg, Hamburg: BGR, pp. 43–52.

Brandt, A., Brökeland, W., Brix, S., Malyutina, M.V. (2004): Diversity of Southern Ocean deep-sea Isopoda (Crustacea, Malacostraca) — a comparison with shelf data. Deep-Sea Research Part II: Topological Studies in Oceanography, 51: 1753–1768.

Brandt, A., Elsner, N.O., Brenke, N., Golovan, O.A., Malyutina, M.V., Riehl, T., Schwabe, E., Würzberg, L. (2013): Epifauna of the Sea of Japan collected via a new epibenthic sledge equipped with camera and environmental sensor systems. Deep-Sea Research Part II: Topological Studies in Oceanography, 86-87: 43–55.

Brandt, A., Elsner, N.O., Malyutina, M.V., Brenke, N., Golovan, O.A., Lavrenteva, A.V., Riehl, T. (2015): Abyssal macrofauna of the Kuril-Kamchatka trench area (northwest pacific) collected by means of a camera-epibenthic sledge. Deep Sea Research Part II: Topical Studies in Oceanography, 111: 175–187.

Brandt, A., Gooday, A.J., Brandão, S.N., Brix, S., Brökeland, W., Cedhagen, T., Choudhury, M., Cornelius, N., Danis, B., de Mesel, I., Diaz, R.J., Gillan, D.C., Ebbe, B., Howe, J.A., Janussen, D., Kaiser, S., Linse, K., Malyutina, M.V., Pawlowski, J., Raupach, M.J., Vanreusel, A. (2007): First insights into the biodiversity and biogeography of the Southern Ocean deep sea. Nature, 447: 307–311.

Brandt, A., Poore, G.C.B. (2003): Higher classification of the flabelliferan and related Isopoda based on a reappraisal of relationships. Invertebrate Systematics, 17: 893–923.

Brenke, N. (2005): An epibenthic sledge for operations on marine soft bottom and bedrock. Marine Technology Society Journal, 39: 10–21.

Brökeland, W. (2005): Systematics, zoogeography, evolution and biodiversity of Antarctic deep-sea Isopoda (Crustacea: Malacostraca). Diss. Hamburg, Germany: University of Hamburg.

Brökeland, W. (2010): Description of four new species from the Haploniscus unicornis Menzies, 1956 complex (Isopoda: Asellota: Haploniscidae). Zootaxa, 2536: 1–35.

Buesseler, K.O. (1998): The decoupling of production and particulate export in the surface ocean. Global Biogeochemical Cycles, 12: 297–310.

Carvalho, F.P., Oliveira, J.M., Soares, A.M.M. (2011): Sediment accumulation and bioturbation rates in the deep Northeast Atlantic determined by radiometric techniques. ICES Journal of Marine Science, 68: 427–435.

Sirenko B.I. (2013): Check list of species of free-living invertebrates of the Russian Far Eastern seas. In: Explorations of the fauna of the seas, 75 (83). St. Petersburg, pp. 1–256.

Cohen, D.M., Inada, T., Iwamoto, T., Scialabba, N. (1990): FAO species catalogue. Vol. 10. Gadiform fishes of the world (order Gadiformes). An annotated and illustrated catalogue of cods, hakes, grenadiers and other gadiform fishes known to date. FAO Fisheries Synopsis 125 (10). FAO, Rome. 442 pp.

Cole, M., Lindique, P., Fileman, E., Clark, J., Lewis, C., Halsband, C., Galloway, T.S. (2016): Microplastics alter the properties and sinking rates of zooplankton faecal pallets. Environmental science and technology, 50: 3239–3246.

Cole, M., Lindique, P., Halsband, C., Galloway, T.S. (2011): Microplastics as contaminants in the marine environment: a review. Marine Pollution Bulletin, 62: 2588–2597.

Comeau S., Gorsky G., Jeffree R., Teyssie J.L., Gatusso J.P. (2009): Impact of ocean acidification on a key Arctic pelagic mollusc (Limacina helicina). Biogeosciences, 6: 1877–1882.

Corse E., Rampal J., Cuoc C., Pech N., Perez Y., Gilles, A. (2013): Phylogenetic analysis of Thecosomata Blainville, 1824 (Holoplanktonic Opisthobranchia) using morphological and molecular data. PLoS ONE, 8: e59439. doi:10.1371/journal.pone.0059439

Cowie, G.L., Hedges, J.I. (1992): Sources and reactivities of amino acids in a coastal marine environment. Limnology and Oceanography, 37: 703–724.

Cutler, E.B. (1994): The Sipuncula. Their Systematics, Biology and Evolution, Cornell University, Ithaca, New York, pp. 1–453.

Dahl, T.M., Falk-Petersen, S., Gabrielsen, G.W., Sargent, J.R., Hop, H., Millar, R.M. (2003): Lipids and stable isotopes in common eider, black-legged kittiwake and northern fulmar: a trophic study from an Arctic fjord. Marine Ecology Progress Series, 256: 257–269.

Dalsgaard, J., St. John, M., Kattner, G., Müller-Navarra, D., Hagen, W. (2003): Fatty acid trophic markers in the pelagic marine environment. Advances in Marine Biology, 46: 225–340.

Dell'Anno, A., Danovaro, R. (2005): Extracellular DNA plays a key role in deep-sea ecosystem functioning. Science, 309: 2179.

Devey, C.W. (Ed.) (2015): RV SONNE Fahrtbericht / Cruise Report SO237 Vema-TRANSIT. Geomar Report, 130 (GEOMAR Report).

Ellingsen, K.E., Brandt, A., Ebbe, B., Linse, K. (2007): Diversity and species distribution of polychaetes, isopods and bivalves in the Atlantic sector of the deep Southern Ocean. Polar Biology, 30: 1432–2056.

Elsner, N.O., Malyutina, M.V., Golovan, O.A., Brenke, N., Riehl, T., Brandt, A. (2015): Deep down: Isopod biodiversity of the Kuril–Kamchatka abyssal area including a comparison with data of previous expeditions of the RV Vityaz. Deep Sea Research Part II: Topical Studies in Oceanography, 111: 210–219.

Engelhardt, T., Kallmeyer, J., Cypionka, H., Engelen, B. (2014): High virus-to-cell ratios indicate ongoing production of viruses in deep subsurface sediments. The ISME Journal, 8:1503–1509. doi:10.1038/ismej.2013.245.

Faure, B., Jollivet, D., Tanguy, A., Bonhomme, F., Bierne, N. (2009): Speciation in the deep sea: multi-locus analysis of divergence and gene flow between two hybridizing species of hydrothermal vent mussels. PLoS ONE, 4: e6485.

Filatova, Z.A. (1971): On some mass species of bivalve molluscs from the ultra-abyssal zone of the Kurile-Kamchatka Trench. Proceedings of P.P. Shirshov Institute of Oceanology, 92: 46–60 [in Russian].

Fischer, V., Elsner, N.O., Brenke, N., Schwabe, E., Brandt, A. (2015): Plastic pollution of the Kuril-Kamchatka Trench (NW pacific), Deep Sea Research Part II: Topical Studies in Oceanography, 111: 399–405.

Fry, B. (1988): Food web structure on Georges Bank from stable C, N and S isotopic composition. Limnology and Oceanography, 33: 1182–1190.

Fujikura, K., Kojima, S., Tamaki, K., Maki, Y., Hunt, J., Okutani, T. (1999): The deepest chemosynthesis-based community yet discovered from the hadal zone, 7326 m deep, in the Japan Trench. Marine Ecology Progress Series, 190: 17–26.

Gage, J.D. (2004): Diversity in deep-sea benthic macrofauna: the importance of local ecology, the larger scale, history and the Antarctic. Deep Sea Research Part II: Topical Studies in Oceanography, 51: 1689–1708.

Gallo, N.D., Cameron, J., Hardy, K., Fryer, P., Bartlett, D.H., Levin, L.A. (2015): Submersible- and lander-observed community patterns in the Mariana and New Britain trenches: Influence of productivity and depth on epibenthic and scavenging communities. Deep-Sea Research I 99: 119–133.

Glazier, A.E., Etter, R.J. (2014): Cryptic speciation along a bathymetric gradient. Biological Journal of the Linnean Society, 113: 897–913.

Glud, R.N., Wenzhofer, F., Middelboe, M., Oguri, K., Turnewitsch, R., Canfield, D.E., Kitazato, H. (2013): High rates of microbial carbon turnover in sediments in the deepest oceanic trench on Earth. Letters to Nature geoscience, 6: 284–288.

Gooday, A.J. (2002): Organic-walled allogromiids: aspects of their occurrence, diversity and ecology in marine habitats. The Journal of Foraminiferal Research, 32: 384–399.

Gooday, A.J., Aranda da Silva, A., Pawlowski, J. (2011): Xenophyophores (Rhizaria, Foraminifera) from the Nazaré Canyon (Portuguese margin, NE Atlantic). Deep-Sea Research Part II: Topological Studies in Oceanography, 58: 2401–2419.

Gooday, A.J., Kamenskaya, O.E., Kitazato, H. (2008): The enigmatic deep-sea, organic-walled foraminiferal genera Chitinosiphon, Nodellum and Resigella (Protista): A taxonomic re-evaluation. Systematics and Biodiversity, 6: 385–404.

Gooday, A.J., Kitazato, H., Hori, H., Toyofuku, T. (2001): Monothalamous soft-shelled Foraminifera at an abyssal site in the North Pacific: a preliminary report. Journal of Oceanography, 57: 377–384.

Gooday. A.J., Hori, S., Todo, Y., Okamoto, T., Kitazato, H., Sabbatini, A. (2004): Soft-walled, monothalamous benthic foraminiferans in the Pacific, Indian and Atlantic Oceans: aspects of biodiversity and biogeography. Deep-Sea Research I, 51: 33–53.

Gregory, M.R. (2009): Environmental implications of plastic debris in marine settings – entanglement, ingestion, smothering, hangers on, hitch-hiking and alien invasions. Philosophical Transactions of the Royal Society B: Biological Sciences, 364: 2013–2025.

Guilini, K., Van Oevelen, D., Soetaert, K., Middelburg, J.J., Vanreusel, A. (2010): Nutritional importance of benthic bacteria for deep-sea nematodes from the Arctic ice margin: results of an isotope tracer experiment. Limnology and Oceanography, 55: 1977–1989.

Hansen, H.J. (1916): Crustacea Malacostraca: The order Isopoda. Danish Ingolf Expedition, 3: 1–262.

Harrington, G. Beach, D.H., Dunham, J.E., Holz, G.G. (1970): The polyunsaturated fatty acids of marine dinoflagellates. Journal of Protozoology, 17: 213–219.

Hartmann, G. (1985): Ostracoden aus der Tiefsee des Indischen Ozeans und der Iberischen See sowie von ostatlantischen sublitoralen Plateaus und Kuppen. Senckenbergiana maritma, 17: 89–146. [in German]

Hausdorf, B. (2011): Progress toward a general species concept. Evolution, 65: 923–931.

Heitland, N. (2015): Genetic allocation of sexual dimorphic individuals in a new deep sea isopod species (Macrostylis papandreas sp. n.) - The potential role of sexual selection in deep-sea diversity. Diss. Hamburg, Germany: University of Hamburg.

Heitland, N., Brandt, A., Riehl, T. (in preparation): A monophyletic clade of sexually dimorphic species indicates a new genus within the family of Macrostylidae (Crustacea : Isopoda).

Held, C., Wägele, J.-W. (2005): Cryptic speciation in the giant Antarctic isopod Glyptonotus antarcticus (Isopoda: Valvifera: Chaetiliidae). Scientia marina, 69: 175–181.

Hessler, R.R., Sanders, H.L. (1967): Faunal diversity in the deep sea. Deep Sea Research and Oceanographic Abstracts, 14: 65–70.

Hessler, R.R., Strömberg, J.O. (1989): Behavior of janiroidean isopods (Asellota), with special reference to deep-sea genera. Sarsia, 74: 145–159.

Hessler, R.R., Jumars, P.A. (1974): Abyssal community analysis from replicate box cores in the central North Pacific. Deep-Sea Research I, 21: 185–209.

Hicks, G.R.F. (1988): Systematics of the Donsiellinae Lang (Copepoda, Harpacticoida). Journal of Natural History, 22: 639–684.

Hicks, G.R.F. (1990): A new species of Donsiella (Copepoda: Harpacticoida) associated with the isopod Limnoria stephenseni Menzies from Macquarie Island. Memoirs of the National Museum of Victoria, 50: 451–456.

Hobson, K.A. (1999): Tracing origins and migration of wildlife using stable isotopes: a review. Oecologia, 120: 314–326.

Horne D.J. (2005): Ostracoda. In: Selley, R.C., Cocks, R.M., Plimer, I.R. (Eds.) Encyclopaedia of Geology, Vol. 3. Elsevier, Oxford, pp. 453–463.

Ingels, J., Billet, D.S.M., Van Gaever, S., Vanreusel, A. (2011): An insight into the feeding ecology of deep-sea canyon nematodes: results from field observations and the first in-situ 13C feeding experiment in the Nazaré Canyon. Journal of Experimental Marine Biology and Ecology, 396: 185–193.

Isobe, A. Uchida, K., Tokai, T., Iwasaki, S. (2015): East Asian Seas: a hot spot of pelagic microplastics. Marine Pollution Bulletin, 101: 618–623.

Itoh, M. (2003): Distribution and formation of Okhotsk Sea Intermediate Water: An analysis of isopycnal climatological data. Journal of Geophysical Research, 108: C8.

Jamieson, A. (2015): The hadal zone: Life in the deepest oceans. Cambridge University Press, Cambridge, 362 pp.

Jażdżewska, A. (2015): Kuril-Kamchatka deep sea revisited – insights into the amphipod abyssal fauna. Deep-Sea Research Part II: Topological Studies in Oceanography, 111: 294–300.

Kates, K., Volcani, B. (1966): Lipid components of diatoms. Biochimica et Biophysica Acta 116: 264–278.

Kattner, G., Hagen, W., Lee, R.F., Campbell, R., Deibel, D., Falk-Peterson, S., Graeve, M., Hansen, B.W., Hirche, H.J., Jónasdóttir, S.H., Madsen, M.L., Mayzaud, P., Müller-Navarra, D., Nichols, P.D., Paffenhöfer, G.A., Pond, D., Saito, H., Stübing, D., Virtue, P. (2007): Perspectives on marine zooplankton lipids. Canadian Journal of Fisheries and Aquatic Sciences, 64: 1628–1639.

Kiyashko, S.I., Kharlamenko, V.I., Sanamyan, K., Alalykina, I.L., Würzberg, L. (2014): Trophic structure of the abyssal benthic community in the Sea of Japan inferred from stable isotope and fatty acid analyses. Marine Ecology Progress Series, 500: 121–137.

Koltun, V.M. (1970): Sponge fauna of the northwestern Pacific from the shallows to the hadal depths. In: Bogorov, V.G. (Ed.), Fauna of the Kurile–Kamchatka Trench and its Environment, Academy of Sciences of the USSR, vol. 86, pp. 1–372.

Kudinova-Pasternak, R.K. (1970): Tanaidacea of the Kurile-Kamchatka Trench. In: Bogorov V.G. (Ed.). Fauna of the Kurile-Kamchatka Trench and its Environment. Academy of Sciences of the USSR, vol. 86, pp. 341–381.

Kussakin, O.G. (2003): Marine and brackish-water Isopoda of the cold and temperate waters of the Northern Hemisphere. III. Suborder Asellota. Part 3. Family Munnopsidae. (Opredeliteli po faune, izdavaemie Zoologicheskim Institutom Rossiyskoy Academii Nauk). St.-Petersburg, Nauka, 381 pp. [in Russian].

Larsen, K., Shimomura, M. (2007): Tanaidacea (Crustacea: Peracarida) from Japan. II. Tanaidomorpha from the East China Sea, the West Pacific Ocean and the Nansei Islands. Zootaxa, 1464: 1–43.

Lecroq, B., Gooday, A.J., Cedhagen, T., Sabbatini, A., Pawlowski, J. (2009a): Molecular analyses reveal high levels of eukaryotic richness associated with enigmatic deep-sea protists (Komokiacea). Marine Biodiversity, 39: 45–55.

Lecroq, B., Gooday, A.J., Tsuchiya, M., Pawlowski, J., (2009b): A new genus of xenophyophores (Foraminifera) from Japan Trench: morphological description, molecular phylogeny and elemental analysis. Zoological Journal of the Linnean Society, 156: 455–464.

Lecroq, B., Lejzerowicz, F., Bachar, D., Christen, R., Esling, P., Baerlocher, L., Østerås, M., Farinelli, L., Pawlowski, J. (2011): Ultra-deep sequencing of foraminiferal microbarcodes unveils hidden richness of early monothalamous lineages in deep-sea sediments. Proceedings of the National Academy of Sciences USA, 108: 13177–13182.

Lejzerowicz, F., Voltski, I, Pawlowski, J. (2015): Foraminifera of the Kuril–Kamchatka Trench area: The prospects of molecular study. Deep-Sea Research Part II: Topological Studies in Oceanography, 111: 19–25.

Lejzerowicz, F., Voltsky, I., Pawlowski, J., (2013): Identifying active foraminifera in the Sea of Japan using metatranscriptomic approach. Deep-Sea Research Part II: Topological Studies in Oceanography 86: 214–220.

Levin, L.A. (1991): Interactions between metazoans and large, agglutinated protozoans: Implications for the community structure of deep-sea benthos. American Zoologist, 31: 886–900.

Lörz, A.-N. (2010): Trench treasures: the genus Princaxelia (Pardaliscidae, Amphipoda). Zoologica Baetica 21: 65–84.

Maas, A.E., Blanco-Bercial, L., Lawson, G.L. (2013): Reexamination of the species assignment of Diacavolinia Pteropods using DNA barcoding. PLoS ONE, 8: e53889. doi:10.1371/journal.pone.0053889

Maddocks, R.F. (1969): Revision of recent Bairdiidae (Ostracoda). United States national museum bulletin, 295: 1–126.

Malyutina, M.V., Brandt, A. (2015): Composition and distribution of Munnopsidae (Crustacea, Isopoda, Asellota), collected during the KuramBio expedition 2012 from the Kuril–Kamchatka Trench area. Deep Sea Research Part II: Topical Studies in Oceanography, 111: 245–255.

McIntyre, A.D., Warwick, R.M. (1984): Meiofauna techniques. In: Holme, N.A., McIntyre, A.D. (Eds.) Methods for the study of marine benthos. Blackwell, Oxford, pp. 217–244.

McLelland, J.C. (2007): Family Pseudotanaidae Sieg, 1976. In: Larsen, K., Shimomura, M. (Eds.) Tanaidacea (Crustacea: Peracarida) from Japan III. The deep trenches; the Kurile-Kamchatka Trench and Japan Trench. Zootaxa, 1599: 87–99.

Menzies, R.J., George, R.Y. (1972): Isopod Crustacea of the Peru-Chile Trench. Anton Bruun Report, 9: 1–124.

Menzies, R.J. (1962): The isopods of abyssal depths in the Atlantic Ocean. In: Barnard, J. L., Menzies, R.J., Bacescu, M.C. (Eds.) Abyssal Crustacea, New York, Columbia University Press. (Vema Research Series), pp. 79–206.

Mezhov, B.V. (1989): Two new species of Macrostylis (Isopoda, Macrostylidae) from the trenches of the Pacific Ocean and comments on the morphology of M. galatheae. Zoologicheskii Zhurnal, 68: 33–40.

Mezhov, B.V. (2004): New species of the genus Macrostylis G.O. Sars, 1864 (Crustacea: Isopoda: Macrostylidae) from the abyssal and ultra-abyssal zones of the Indian Ocean. Arthropoda Selecta, 3–4.

Michener R.H., Schell D.M. (1994): Stable isotope ratios as tracers in marine and aquatic food webs. In: Lajtha, K., Michener, R.H. (Eds.) Stable isotopes in ecology and environmental science. Blackwell Scientific Publications, Oxford, pp. 138–157.

Minagawa, M., Wada, T. (1984): Stepwise enrichment of 15N along food chains: further evidence and the relation between δ15N and animal age. Geochimica et Cosmochimica Acta, 48: 1135–1140.

Nakabo, T., Kai, Y. (2013): Macrouridae. In: Nakabo, T. (Ed.) Fishes of Japan with pictorial keys to the species, 3rd edition, Tokai University Press, Hadano, pp. 493–512, 1872–1876 [In Japanese].

Nielsen, J.G. (1977): The deepest living fish Abyssobrotula galatheae. A new genus and species of oviparous ophidioids (Pisces, Brotulidae). Galathea Report, 14: 41–48.

Palumbi, S.R. (1994): Genetic divergence, reproductive isolation, and marine speciation. Annual Review of Ecology and Systematics, 25: 547–572.

Pawlowski, J., Holzmann, M. (2014): A plea for DNA barcoding of Foraminifera. The Journal of Foraminiferal Research, 44: 62–67.

Peine, F., Turnewitsch, R., Mohn, C., Reichelt, T., Springer, B., Kaufmann, M., (2009): The importance of tides for sediment dynamics in the deep sea – Evidence from the particulate-matter tracer 234Th in deep-sea environments with different tidal forcing. Deep-Sea Research I, 56: 1182–1202.

Peters, K.E., Walters, C.C., Moldowan, J.M. (2005): The biomarker guide: biomarkers and isotopes in the environment and human history. Cambridge University Press, Cambridge.

Peters, J., Renz, J., Van Beusekom, J., Boersma, M., Hagen, W. (2006): Trophodynamics and seasonal cycle of the copepod Pseudocalanus acuspes in the Central Baltic Sea (Bornholm Basin): evidence from lipid composition. Marine Biology, 149: 1417–1429.

Post, D.M. (2002): Using stable isotopes to estimate trophic position. Models, methods and assumptions. Ecology, 83: 703–718.

Rabinovich, A.B., Thomson, R.E., Bograd, S.J. (2002): Drifter observations of anticyclonic eddies near Bussol' Strait, the Kuril Islands. Journal of Oceanography, 58: 661–671.

Rae, K., Rees, C. (1947): Continuous plankton records: the Copepoda of the North Sea, 1938-1939. Hull Bulletins of Marine Ecology, 2: 95–132.

Ratnasingham, S., Hebert, P.D.N. (2007): BOLD: The Barcode of Life Data System (http://www.barcodinglife.org). Molecular Ecology Notes, 7: 355–364.

Rau, G.H., Ainley, D.G., Bengston, J.L., Torres, J.J., Hopkins, T.L. (1992): N-15/N-14 and C-13/C-12 in Weddell Sea birds, seals, and fish: implications for diet and trophic structure. Marine Ecology Progress Series, 84: 1.

Riehl, T., Brandt, A. (2010): Descriptions of two new species in the genus Macrostylis Sars, 1864 (Isopoda, Asellota, Macrostylidae) from the Weddell Sea (Southern Ocean), with a synonymisation of the genus Desmostylis Brandt, 1992 with Macrostylis. Zookeys, 57: 9–49.

Riehl, T., Brandt, A. (2013): Southern Ocean Macrostylidae reviewed with a key to the species and new descriptions from Maud Rise. Zootaxa, 3692: 160–203.

Riehl, T., Kaiser, S. (2012): Conquered from the deep sea? A new deep-sea isopod species from the Antarctic shelf shows pattern of recent colonization. PLoS ONE, 7: e49354.

Riehl, T. (2012): Macrostylidae of the Kurile-Kamchatka-Trench area. In: The German-Russian deep-sea expedition KuramBio (Kurile Kamchatka Biodiversity Study), Brandt, A., Malyutina, M.V. (Eds.), Biocenter Grindel & Zoological Museum, University of Hamburg, Hamburg: BGR, pp. 51–56.

Riehl, T. (2014): A phylogenetic approach to the classification of macrostylid isopods and faunal linkages between the deep sea and shallow-water environments. Diss. Hamburg, Germany: University of Hamburg. Available from: http://ediss.sub.uni-hamburg.de/volltexte/2014/6839/. [Accessed 2014-07-28].

Riehl, T., Brenke, N., Brix, S., Driskell, A., Kaiser, S., Brandt, A. (2014): Field and laboratory methods for DNA barcoding and molecular-systematic studies on deep-sea isopod crustaceans. Polish Polar Research, 35: 205–226.

Riehl, T., Wilson, G.D.F., Hessler, R.R. (2012): New Macrostylidae Hansen, 1916 (Crustacea: Isopoda) from the Gay Head-Bermuda transect with special consideration of sexual dimorphism. Zootaxa, 3277: 1–26.

Rudjakov J.A. (1961): A new ostracod species of the family Cytheridae from the ultra-abyssal depth of the Java Trench. Transactions of the institute of oceanology, 51: 116–120 [in Russian].

Sargent, J., Whittle, K. (1981): Lipids and hydrocarbons in the marine food web. In: Longhurst, A. (Ed.) Analysis of Marine Ecosystems. Academic Press, London, pp. 491–533.

Sargent, J., Eilertsen, H.C., Falk-Peterson, S., Taasen, J.P. (1985): Carbon assimilation and lipid production in phytoplankton in northern Norwegian fjords. Marine Biology, 85: 109–116.

Sars, G.O. (1865): Om en anomal Gruppe af Isopoder. Forhandlinger Videnskaps-Selskapet, Anar 1863 in Christiana, 205–221.

Sars, G.O. (1899): An account of the Crustacea of Norway with short descriptions and figures of all the species: Isopoda. Cammermeyer, A. (Ed.) Bergen: Bergen Museum.

Schornikov, E.I. (1987): Two new subgenera of bythocytherid ostracodes. Zoological Journal, 66: 996–1004 [in Russian].

Shuman, F.R., Lorenzen, C.F. (1975): Quantitative degradation of chlorophyll by a marine herbivore. Limnology and Oceanography, 20: 580–586.

Sokolova, M.N. (1986): Feeding and trophic structure in the deep-sea macrobenthos. Nauka, Moscow.

Svavarsson, J. (1987): Systematics and zoogeography of arctic deep-sea asellote isopods (Crustacea, Isopoda), with notes on the biology of the eurycopid Eurycope brevirostris Hansen, 1916 (Asellota, Eurycopidae). Diss. University of Gothenburg. Available from: http://hdl.handle.net/2077/12131.

Tendal, O.S. (1989): Phylum Xenophyophora. In: Margulis, L., Corlis, J.O., Melkonian, M., Chapman, D.J. (Eds.) Handbook of the protoctista, Boston, MA, Johnes and Bartlett Publisher, pp. 135–138.

Tendal, O.S., Hessler, R.R. (1977): An introduction to the biology and systematics of Komokiacea (Textulariina, Foraminiferida). Galathea Report, 14: 165–194.

Thistle, D., Wilson, G.D.F. (1987): A hydrodynamically modified, abyssal isopod fauna. Deep-Sea Research Part A: Oceanographic Research Papers, 34: 73–87.

Thistle, D., Wilson, G.D.F. (1996): Is the HEBBLE isopod fauna hydrodynamically modified? A second test. Deep-Sea Research I, 43: 545–554.

Todo, Y., Kitazato, H., Hashimoto, J., Gooday, A.J. (2005): Simple Foraminifera flourish at the Ocean's deepest point. Science, 307: 689.

Turnewitsch, R., Falahat, S., Nycander, J., Dale, A., Scott, R.B., Furnival, D. (2013): Deep-sea fluid and sediment dynamics — Influence of hill- to seamount-scale seafloor topography. Earth-Science Reviews, 127: 203–241.

Turnewitsch, R., Falahat, S., Stehlikova, J., Oguri, K., Glud, R.N., Middelboe, M., Kitazato, H., Wenzhöfer, F., Ando, K., Fujio, S., Yanagimoto, D. (2014): Recent sediment dynamics in hadal trenches: Evidence for the influence of higher-frequency (tidal, near-inertial) fluid dynamics. Deep-Sea Research I, 90: 125–138.

Turnewitsch, R., Witte, U., Graf, G. (2000): Bioturbation in the abyssal Arabian Sea: influence of fauna and food supply. Deep-Sea Research Part II: Topological Studies in Oceanography, 47: 2877–2911.

Uehara, K., Miyake, H. (1999): Deep flows on the slope inshore of the Kuril-Kamchatka Trench southeast off Cape Erimo, Hokkaido. Journal of Oceanography, 55: 559–573.

Van Soest, R.W.M., Boury-Esnault, N., Vacelet, J., Dohrmann, M., Erpenbeck, D., De Voogd, N.J., et al (2012): Global Diversity of Sponges (Porifera). PLoS ONE, 7: e35105. doi:10.1371/journal.pone.0035105

Verardo, D.J., Froelich, P.N., McIntyre, A. (1990): Determination of organic carbon and nitrogen in marine sediments using the Carlo Erba NA-1500 Analyzer. Deep Sea Research Part A. Oceanographic Research Papers, 37: 157–165.

Vinogradov, M.E. (1970): The vertical distribution of zooplankton in the Kurile-Kamchatka Region of the Pacific Ocean (based on the data of the 39th cruise of the R/V "Vityaz). In: Bogorov, V.G. (Ed.), Transactions of the P.P. Shirshov Institute of Oceanology. Nauka, Moscow, pp. 99–116.

Wägele, J.-W. (1989): Evolution und phylogenetisches System der Isopoda: Stand der Forschung und neue Erkenntnisse [Evolution and phylogeny of isopods. New data and the state of affairs]. Stuttgart: E. Schweizerbart'sche Verlagsbuchhandlung (Zoologica). ISBN 978-3-510-55026-5.

Wang, J., Tan, Z., Peng, J., Qui, Q., Li, M. (2016): The behaviors of microplastics in the marine environment. Marine Environmental Research, 113: 7–17.

Williams, J.D., Boyko, C.B. (2012): The Global Diversity of Parasitic Isopods Associated with Crustacean Hosts (Isopoda: Bopyroidea and Cryptoniscoidea). PLoS One, 7: e35350.

Wilson, G.D.F., Hessler, R.R. (1987): Speciation in the deep sea. Annual Reviews in Ecology and Systematics, 18: 185–207.

Wilson, G.D.F., Schotte, M. WoRMS - World Register of Marine Species - Haploniscidae Hansen, 1916. [online] (2008-onwards). Available from: http://www.marinespecies.org/aphia.php?p=taxdetails&id=118254. [Accessed 2016-09-22].

Wilson, G.D.F. (1983): Variation in the deep-sea isopod Eurycope iphthima (Asellota, Eurycopidae): depth related clines in rostral morphology and in population structure. Journal of Crustacean Biology, 3: 127–140.

Wilson, G.D.F. (2008): Local and regional species diversity of benthic Isopoda (Crustacea) in the deep Gulf of Mexico. Deep-Sea Research Part II: Topological Studies in Oceanography, 55: 2634–2649.

Woodall, L.C., Sanchez-Vidal, A., Canals, M., Paterson, G.L., Coppock, R., Sleight, V., Calafat, A., Rogers, A.D., Narayanaswamy, B.B., Thompson, R.C. (2014): The deep sea is a major sink for microplastic debris, Royal Society Open Science, 1: 1–8.

Zenkevitch, L.A., (1958): The deep-sea echiurids of the north-western part of the Pacific Ocean. Trüdy Instituta. Okeanologii Akademii Nauk. SSSR, 27: 192–203.

Zenkevitch, L.A. (1966): The systematics and distribution of abyssal and hadal (ultraabyssal) Echiuroidea. Galathea Report, 8: 175–183.

10. Abbreviations /Abkürzungen

AGT – Agassiz trawl

C-EBS – camera-epibenthic sledge

CTD – conductivity, temperature density probe

EBS – epibenthic sledge

GKG – giant box corer

KuramBio – Kuril-Kamchatka Biodiversity Studies

MN – multinet

MUC – multicorer

SoJaBio – Sea of Japan Biodiversity Studies

SokhoBio – Sea of Okhotsk Biodiversity Studies

11. Appendices /Anhänge

A) Participating Institutions /Liste der teilnehmenden Institutionen

AORI
Atmosphere and Ocean Research Institute,
University of Tokyo
Kashiwanoha, Kashiwa-shi, Chiba 277-8564
Japan
www.aori.u-tokyo.ac.jp

DZMB HH
Deutsches Zentrum für Biodiversitätsforschung in Hamburg
(German Center for Marine Biodiversity Research Hamburg
Martin-Luther-King-Platz 3
20146 Hamburg, Germany
www.senckenberg.de

DZMB WHV
Deutsches Zentrum für Biodiversitätsforschung in WHV
(German Center for Marine Biodiversity Research Wilhelmshaven
Südstrand 40
26382 Wilhelmshaven, Germany
www.senckenberg.de

FIS – Forschungsinstitut Senckenberg, Frankfurt
Forschungsinstitut Senckenberg und Naturmuseum
Senckenberganlage 25
60325 Frankfurt
www.senckenberg.de

HCU – HafenCity University Hamburg
Überseeallee 16

20457 Hamburg
http://www.hcu-hamburg.de/

HU KOREA
Hanyang University Korea
222 Wangsimni-ro, Seongdong-gu
Seoul, Südkorea
www.hanyang.ac.kr

IMB
A.V. Zhirmunsky Institute of Marine Biology FEB RAS
Palchevskogo 17
690041
Vladivostok, Russia
www.imb.dvo.ru

IORAS
P. P. Shirshov Institute of Oceanology
Russian Academy of Sciences
Nakhimovsky prospect, 36
117997, Moscow, Russia
www.ocean.ru

MSU
Lomonosov Moscow State University
Biological Faculty
Invertebrate Zoology Department
Leninskie gory 1-12
119899 Moscow, Russia
www.msu.ru

NSM
Department of Zoology
National Science Museum
7-20 Ueno Park, Taito-ku
Tokyo 110-8718, Japan#
www.kahaku.go.jp

PBO
University of Lodz
Department of Polar Biology and Oceanobiology
ul. Banacha 12/16, 90-237
Lodz, Poland
www.iso.uni.lodz.pl

POI
V.I.Il`ichev Pacific Oceanological Institute, FEB RAS
Baltiyskaya St. 43
690041, Vladivostok, Russia
www.mathnet.ru

SAMS
Scottish Association of Marine Sciences
Scottish Marine Institute

Oban PA37 1QA
Vereinigtes Königreich
www.sams.ac.uk

UG
University of Geneva
Department of Genetics and Evolution (GenEv)
University of Geneva
quai Ernest Ansermet 30
CH1211 Geneva, Switzerland
www.unige.ch

TMSS
Takehara Marine Science Station
Setouchi Field Science Center
Hiroshima University, 5-8-1
Minato-machi, Takehara City,
Hiroshima 725-0024, Japan
www.hiroshima-u.ac.jp

ZMH (CeNak)
Zoological Museum Hamburg
Centre of Natural History
University of Hamburg
Martin-Luther-King-Platz 3
20146 Hamburg , Germany
www.cenak.uni-hamburg.de

ZSM
Zoologische Staatssammlung München
Münchhausenstraße 21
81247 München, Germany
www.zsm.mwn.de

B) Estimation of the number of species sorted from all gear during the expedition KuramBio II (SO250)

Table 29: Preliminary account of the species identified to species level on board yielded > 1328 species from abyssal and hadal depths in the Kuril-Kamchatka Trench.

Phylum/ Class/*Order*	Number of collected species
Foraminifera	>153
Porifera	>20
Cnidaria	
Hydrozoa	7
Scyphozoa (Coronata)	2
Anthozoa	>11
Ctenophora	
Platyhelminthes	
Nemertea	>25
Nematoda	>200
Mollusca	
Bivalvia	>25
Gastropoda	>37
Scaphopoda	5
Cephalopoda	2
Aplacophora	>5
Monoplacophora	1
Annelida	
Polychaeta	>200
Pogonophora	4
Echiura	6
Hirudinea	1
Sipunculida	5
Scalidophora	
Loricifera	
Priapulida	1
Kinorhyncha	>2
Tardigrada	
Arthropoda	
Ostracoda	>24
Copepoda	>150
Amphipoda	>66
Isopoda	>120
Tanaidacea	>35
Cumacea	>29
Mysida	>5
Lophogastrida	1
Euphausiacea	3
Leptostraca	
Decapoda	1
Pycnogonida	>4
Kamptozoa	8
Bryozoa	>4
Echinodermata	
Crinoidea	1
Asteroidea	7
Echinoidea	5
Holothuroidea	>30
Ophiuroidea	>5
Chaetognatha	>5
Hemichordata	1
Chordata	
Salpida	1
Ascidiacea	3
Osteichthyes	5
Total	>1328

C) Station List / Stationsliste

Abkürzungen / Abbreviation

z.W	zu Wasser / into water
a.D.	an Deck / on deck
Slmax	(maximale) Seillänge / max. rope-length
LT	Lottiefe nach EM 122 / Depth of EM 122
W ...	eingesetzte Winde / Winch used
nm	Seemeilen / nautical miles
EM/PS	SIMRAD Multibeam / Parasound
rwk / COG:	Rechtweisender Kurs / true course
d:	Distanz / distance
v:	Geschwindigkeit in Knoten / SOG in knots
SL:	Seillänge / rope-length
SZ:	Seilzug / rope tension

Eingesetzte Geräte / Equiopment used	**Einsätze / tasks**
CTD	8
Multischließnetz	11
Multicorer	24
Großkastengreifer	16
Epi-Benthosschlitten	18
Agassiz-Trawl	16
EM 122-Profilfahrt	13
Σ	106

Geräteverluste / lost Equipment: keine

Station	Date / Time UTC	Device	Device Abbreviation	Action	Comment (Station)	Comment (Device Op)	Comment (Action)	Expedition Fixed	Latitude	Longitude	Depth (m)	Speed (kn)	Wind Dir	Wind speed (m/s)	Course
Station - Device	date time	Device	Code	Action	Comment (Station)	Comment (Device Opera	Comment (Action)	Expedition Fixed	Latitude	Longitude	Depth (m)	Speed (kn)	Vind Dir	ind Speed (m	Course
SO250_1-1	17.08.2016 16:15:52	CTD	CTD	station start			clean ship	f	43° 49,201' N	151° 45,604' E	5143,9	0,4	162,9	12,4	273,7
SO250_1-1	17.08.2016 17:35:38	CTD	CTD	max depth/on ground			SLmax 2000m / EL2	f	43° 49,197' N	151° 45,607' E	5144,4	0,3	155,6	11,2	61,3
SO250_1-1	17.08.2016 17:38:34	CTD	CTD	hoisting				f	43° 49,199' N	151° 45,603' E	5147,5	0,3	157,9	12,1	230,1
SO250_1-1	17.08.2016 18:20:20	CTD	CTD	on deck				f	43° 49,201' N	151° 45,615' E	5147	0,5	159,9	11	31,1
SO250_1-1	17.08.2016 18:25:24	CTD	CTD	station end				f	43° 49,200' N	151° 45,615' E	5143,3	0,4	157,1	12,9	270,8
SO250_2-1	17.08.2016 19:04:35	KONGSBERG EM122	EM122	station start			rwK 149°, FüG 6kn	f	43° 50,721' N	151° 42,874' E	5228,9	7,9	164,7	12,8	141,8
SO250_2-1	17.08.2016 19:47:51	KONGSBERG EM122	EM122	alter course			auf 045°rw	f	43° 47,125' N	151° 45,850' E	5086	5,8	164	11,4	147,6
SO250_2-1	17.08.2016 20:05:36	KONGSBERG EM122	EM122	alter course			auf 325°rw	f	43° 48,145' N	151° 47,941' E	5077,4	5,6	174,4	10,7	46,9
SO250_2-1	17.08.2016 20:51:46	KONGSBERG EM122	EM122	station end				f	43° 51,820' N	151° 44,882' E	5202,1	5,8	165,8	11,4	327,4
SO250_3-1	17.08.2016 21:42:33	Net (generic)	NET	station start			clean ship	f	43° 49,205' N	151° 45,652' E	5142,7	1	165,5	10,7	247,2
SO250_3-1	17.08.2016 22:08:08	Net (generic)	NET	information			Gerät z/W, EL 2	f	43° 49,202' N	151° 45,609' E	5148,7	0,4	167,5	11,4	228,6
SO250_3-1	18.08.2016 00:12:48	Net (generic)	NET	information			max depth, SLmax 5000m	f	43° 49,195' N	151° 45,598' E	5114,3	0,5	155,3	11,4	255,7
SO250_3-1	18.08.2016 03:13:30	Net (generic)	NET	information			Gerät a/D	f	43° 49,201' N	151° 45,594' E	5144,8	0,6	148,5	10,8	108,6
SO250_3-1	18.08.2016 03:20:03	Net (generic)	NET	station end				f	43° 49,195' N	151° 45,595' E	5146	0,4	148,1	9,1	211,1
SO250_4-1	18.08.2016 03:21:55	Multi Corer	MUC	station start				f	43° 49,194' N	151° 45,595' E	5143,4	1,4	145	9,8	263,1
SO250_4-1	18.08.2016 03:33:34	Multi Corer	MUC	in the water			FW1 / SPW1	f	43° 49,200' N	151° 45,589' E	5144,7	0,9	149,1	9,3	268
SO250_4-1	18.08.2016 03:40:22	Multi Corer	MUC	information			bei SL 100m Transponder am Dr	f	43° 49,201' N	151° 45,601' E	5139,6	0,2	142,6	10,8	197,7
SO250_4-1	18.08.2016 05:14:01	Multi Corer	MUC	max depth/on ground			SLmax 5192m	f	43° 49,201' N	151° 45,589' E	5146,6	0,4	138,7	11	256,4
SO250_4-1	18.08.2016 05:14:57	Multi Corer	MUC	hoisting			SZmax 59,4kN	f	43° 49,202' N	151° 45,590' E	5147,5	1,4	145,1	9,5	264,9
SO250_4-1	18.08.2016 06:56:37	Multi Corer	MUC	information			Transponder a/D	f	43° 49,200' N	151° 45,599' E	5144,2	0,5	140,3	8,9	84,9
SO250_4-1	18.08.2016 07:02:10	Multi Corer	MUC	on deck				f	43° 49,197' N	151° 45,588' E	6016,7	0,1	138,6	10	327,4
SO250_4-1	18.08.2016 07:13:38	Multi Corer	MUC	station end				f	43° 49,200' N	151° 45,589' E	5147,5	0,3	144,2	9,8	71
SO250_5-1	18.08.2016 07:24:34	Multi Corer	MUC	station start				f	43° 49,196' N	151° 45,593' E	5149,4	0,6	138,4	9,5	67,5
SO250_5-1	18.08.2016 07:25:11	Multi Corer	MUC	in the water			FW1 / SPW1	f	43° 49,196' N	151° 45,593' E	5149,5	0,3	141,6	9,3	265,8
SO250_5-1	18.08.2016 09:08:34	Multi Corer	MUC	max depth/on ground			SLmax 5199m	f	43° 49,192' N	151° 45,599' E	5146,7	0,2	136,1	10	49
SO250_5-1	18.08.2016 09:14:17	Multi Corer	MUC	hoisting			SZmax 61,8kN	f	43° 49,194' N	151° 45,606' E	5147	0,7	130,4	10,5	140
SO250_5-1	18.08.2016 11:14:55	Multi Corer	MUC	on deck				f	43° 49,199' N	151° 45,605' E	5145	1,2	133,1	10,1	88
SO250_5-1	18.08.2016 11:15:19	Multi Corer	MUC	station end				f	43° 49,199' N	151° 45,605' E	5144,7	0,6	138,8	10,7	283,9
SO250_6-1	18.08.2016 11:47:45	Giant Box Corer	GKG	station start				f	43° 49,198' N	151° 45,610' E	5145,6	1	140,5	10,7	240,1
SO250_6-1	18.08.2016 11:50:18	Giant Box Corer	GKG	in the water			FW1/SPW1	f	43° 49,200' N	151° 45,611' E	5145,1	0,6	145,4	9,9	240,6
SO250_6-1	18.08.2016 12:05:41	Giant Box Corer	GKG	information			SL 500m, Hieven wegen Spulfeh	f	43° 49,196' N	151° 45,600' E	5145,8	0,6	130,7	10	267
SO250_6-1	18.08.2016 12:13:40	Giant Box Corer	GKG	information			SL 348m Winde gestoppt, Spulfehler behoben E	f	43° 49,202' N	151° 45,590' E	5147,7	0,1	136,4	10,4	166

Station	Date / Time UTC	Device	Device Abbreviation	Action	Comment (Station)	Comment (Device Op)	Comment (Action)	Expedition Fixed	Latitude	Longitude	Depth (m)	Speed (kn)	Wind Dir	Wind speed (m/s)	Course
SO250_6-1	18.08.2016 13:39:46	Giant Box Corer	GKG	max depth/on ground			SLmax 5192m	f	43° 49,197' N	151° 45,609' E	5496,6	1,1	131,4	10,1	281,5
SO250_6-1	18.08.2016 13:42:15	Giant Box Corer	GKG	hoisting			SZmax 74,0 kN	f	43° 49,198' N	151° 45,611' E	5143,6	0,2	144,4	10,2	85,8
SO250_6-1	18.08.2016 15:46:10	Giant Box Corer	GKG	on deck				f	43° 49,194' N	151° 45,607' E	5143	0,6	137,9	11,3	234,3
SO250_6-1	18.08.2016 16:28:55	Giant Box Corer	GKG	station end				f	43° 49,201' N	151° 45,598' E	5201,5	1	137,2	12	69,7
SO250_7-1	18.08.2016 17:19:25	Agassiz Trawl	AGT	station start				f	43° 52,459' N	151° 44,274' E	5229,7	0,5	139,6	9,5	194,2
SO250_7-1	18.08.2016 17:23:52	Agassiz Trawl	AGT	in the water			FW1 / SPW1, rwK 172°, d 2,8n	f	43° 52,446' N	151° 44,282' E	5230	0,3	138,9	9,8	74,3
SO250_7-1	18.08.2016 20:04:59	Agassiz Trawl	AGT	information			BoKo SL 5780m	f	43° 49,814' N	151° 44,787' E	5210,1	1,1	142,5	9,6	184,9
SO250_7-1	18.08.2016 20:43:26	Agassiz Trawl	AGT	information			Auslegen rwK 172°, d 1,00nm	f	43° 49,214' N	151° 44,904' E	5196,1	1	137,5	10	173,2
SO250_7-1	18.08.2016 21:49:52	Agassiz Trawl	AGT	max depth/on ground			SLmax 7502m, Start Schleppe	f	43° 48,209' N	151° 45,070' E	5109,2	1,1	137,9	11,7	170,4
SO250_7-1	18.08.2016 22:01:03	Agassiz Trawl	AGT	hoisting				f	43° 48,075' N	151° 44,947' E	5105,4	0,8	134,9	10,9	255,1
SO250_7-1	18.08.2016 23:11:36	Agassiz Trawl	AGT	information			frei vom Grund; SL: 5730 m; SZmax:	f	43° 48,076' N	151° 45,255' E	5103,3	0,6	135,7	11,6	75,8
SO250_7-1	19.08.2016 02:54:39	Agassiz Trawl	AGT	on deck				f	43° 47,930' N	151° 45,307' E	5103,5	0,8	161,4	9,7	293,2
SO250_7-1	19.08.2016 02:57:25	Agassiz Trawl	AGT	station end				f	43° 47,929' N	151° 45,306' E	5103,5	0,3	157,5	10,3	126,9
SO250_8-1	19.08.2016 03:50:50	EpiBenthic Sledge	EBS	station start				f	43° 51,698' N	151° 45,851' E	5191,2	0,3	165,1	8,1	2,8
SO250_8-1	19.08.2016 03:53:25	EpiBenthic Sledge	EBS	in the water			FW1 / SPW1	f	43° 51,695' N	151° 45,856' E	5190,5	0,6	165,6	8,9	134,2
SO250_8-1	19.08.2016 06:08:09	EpiBenthic Sledge	EBS	information			BoKo, SL: 5650 m	f	43° 49,550' N	151° 46,254' E	5149,9	1,1	180,2	11,8	187,1
SO250_8-1	19.08.2016 06:08:46	EpiBenthic Sledge	EBS	information			Auslegen, rwK: 172°, d: 1,00nn	f	43° 49,540' N	151° 46,256' E	5142,8	0,9	186,2	9,2	186,6
SO250_8-1	19.08.2016 07:01:04	EpiBenthic Sledge	EBS	max depth/on ground			SLmax: 7500m, Start Schleppe	f	43° 48,593' N	151° 46,433' E	5107	0,5	186,9	9,6	29
SO250_8-1	19.08.2016 07:03:34	EpiBenthic Sledge	EBS	hoisting				f	43° 48,588' N	151° 46,438' E	5108,5	1	186,3	10,1	291,1
SO250_8-1	19.08.2016 08:18:38	EpiBenthic Sledge	EBS	information			frei vom Grund, SL 5418m, SZmax 6	f	43° 48,598' N	151° 46,477' E	5106,7	0,2	185,8	9,6	303,4
SO250_8-1	19.08.2016 10:22:03	EpiBenthic Sledge	EBS	on deck				f	43° 48,605' N	151° 46,477' E	5106	0,5	188	8,9	341,1
SO250_8-1	19.08.2016 11:06:12	EpiBenthic Sledge	EBS	station end				f	43° 48,650' N	151° 46,550' E	5109,7	0,8	190	8,9	45,7
SO250_9-1	19.08.2016 12:00:19	Agassiz Trawl	AGT	station start			FW1 /SPW1	f	43° 52,385' N	151° 43,600' E	5258,3	0,4	178,3	9,4	265,4
SO250_9-1	19.08.2016 12:08:41	Agassiz Trawl	AGT	in the water			rwK 171°, d: 3,8 nm	f	43° 52,281' N	151° 43,621' E	5252	0,8	185,6	8,9	185,7
SO250_9-1	19.08.2016 16:02:59	Agassiz Trawl	AGT	information			Boko, SL 6410m	f	43° 48,439' N	151° 44,351' E	5134,2	1,3	194,8	8,3	156,6
SO250_9-1	19.08.2016 16:04:00	Agassiz Trawl	AGT	information			Auslegen, rwK 172°, d 1nm	f	43° 48,423' N	151° 44,354' E	5132,4	1,1	191,5	8,7	186,2
SO250_9-1	19.08.2016 16:42:51	Agassiz Trawl	AGT	max depth/on ground			SLmax 7500m, Start Schleppe	f	43° 47,802' N	151° 44,474' E	5100,8	1,2	190,3	9,2	155,3
SO250_9-1	19.08.2016 16:53:14	Agassiz Trawl	AGT	hoisting				f	43° 47,644' N	151° 44,503' E	5101,7	0,2	189,9	9,3	42,1
SO250_9-1	19.08.2016 18:07:25	Agassiz Trawl	AGT	information			frei vom Grund, SL 5798m, SZmax 6	f	43° 47,643' N	151° 44,513' E	5101,5	0,3	196,1	9,5	95,1
SO250_9-1	19.08.2016 20:53:50	Agassiz Trawl	AGT	on deck				f	43° 47,647' N	151° 44,515' E	5101,4	0,2	189,4	8,3	276
SO250_9-1	19.08.2016 21:05:02	Agassiz Trawl	AGT	station end				f	43° 47,674' N	151° 44,499' E	5101,1	1	188,3	8,5	13,6
SO250_10-1	19.08.2016 21:52:00	EpiBenthic Sledge	EBS	station start				f	43° 51,810' N	151° 46,543' E	5188,1	0,8	192	9,5	39,2
SO250_10-1	19.08.2016 21:54:42	EpiBenthic Sledge	EBS	in the water			FW1 / SPW1	f	43° 51,791' N	151° 46,543' E	5188	0,6	186,1	8,6	203,2
SO250_10-1	20.08.2016 00:20:09	EpiBenthic Sledge	EBS	information			BoKo SL.: 5677m	f	43° 49,437' N	151° 46,969' E	5119,5	0,8	181,8	7,5	177,5
SO250_10-1	20.08.2016 00:21:04	EpiBenthic Sledge	EBS	information			Auslegen, rwk 172° d: 2,4nm	f	43° 49,423' N	151° 46,971' E	5118,9	1,2	185,4	7,5	192,8
SO250_10-1	20.08.2016 01:05:40	EpiBenthic Sledge	EBS	max depth/on ground			SL max.: 7500m, Start Schleppe	f	43° 48,602' N	151° 47,124' E	5352	1,2	179,6	8,5	200,2
SO250_10-1	20.08.2016 01:16:09	EpiBenthic Sledge	EBS	hoisting				f	43° 48,446' N	151° 47,165' E	5102,2	0,2	177	7,9	86,4
SO250_10-1	20.08.2016 02:54:56	EpiBenthic Sledge	EBS	information			frei vom Grund, SL.: 5357m SZ max.:	f	43° 48,455' N	151° 47,171' E	5104,3	0,2	183,6	9,2	229,7
SO250_10-1	20.08.2016 05:38:36	EpiBenthic Sledge	EBS	on deck				f	43° 48,453' N	151° 47,203' E	5104,4	0,1	169,8	8,1	145,6
SO250_10-1	20.08.2016 05:59:41	EpiBenthic Sledge	EBS	station end				f	43° 48,460' N	151° 47,187' E	5103	0,1	164,7	9,5	81,5
SO250_11-1	20.08.2016 18:50:36	CTD	CTD	station start			clean ship	f	46° 4,623' N	153° 58,207' E	8123,8	0,4	198,5	10,7	281,5
SO250_11-1	20.08.2016 18:52:21	CTD	CTD	in the water			EL 2	f	46° 4,621' N	153° 58,202' E	8126,8	0,5	194,8	12,5	280,6
SO250_11-1	20.08.2016 19:20:53	CTD	CTD	max depth/on ground			SLmax 1000m	f	46° 4,613' N	153° 58,210' E	8126,8	0,3	242,7	3,5	251,9
SO250_11-1	20.08.2016 19:46:00	CTD	CTD	on deck				f	46° 4,623' N	153° 58,198' E	8128,1	0,1	NaN	NaN	218,9
SO250_11-1	20.08.2016 19:47:32	CTD	CTD	station end				f	46° 4,619' N	153° 58,198' E	8135,5	0,2	211	3,5	111,4
SO250_12-1	20.08.2016 20:22:58	KONGSBERG EM122	EM122	station start				f	46° 3,607' N	153° 55,424' E	7869,1	6,1	203,8	8,4	15,2
SO250_12-1	20.08.2016 20:23:06	KONGSBERG EM122	EM122	profile start			rwK 031°, FüG 6kn	f	46° 3,622' N	153° 55,430' E	7877	6,7	200,2	8,7	15,4
SO250_12-1	20.08.2016 21:03:46	KONGSBERG EM122	EM122	alter course			auf 141°rw	f	46° 7,206' N	153° 58,483' E	7900,2	6,3	192,3	9,6	34,6
SO250_12-1	20.08.2016 21:25:14	KONGSBERG EM122	EM122	alter course			auf 210°rw	f	46° 5,929' N	154° 0,485' E	8085,1	5,9	203,3	11,1	145,3

Station	Date / Time UTC	Device	Device Abbreviation	Action	Comment (Station)	Comment (Device Op)	Comment (Action)	Expedition Fixed	Latitude	Longitude	Depth (m)	Speed (kn)	Wind Dir	Wind speed (m/s)	Course
SO250_12-1	20.08.2016 22:13:11	KONGSBERG EM122	EM122	profile end				f	46° 1,819' N	153° 57,436' E	8617,1	6,2	185,7	10,6	206,3
SO250_12-1	20.08.2016 22:13:15	KONGSBERG EM122	EM122	station end				f	46° 1,813' N	153° 57,431' E	8617,6	5,9	191,9	9,2	212,6
SO250_13-1	20.08.2016 22:42:44	Net (generic)	NET	station start			clean ship	f	46° 4,623' N	153° 58,242' E	8135,5	0,7	191,9	10,1	139,2
SO250_13-1	20.08.2016 22:49:49	Net (generic)	NET	information			Gerät z/W, EL 2	f	46° 4,621' N	153° 58,202' E	8133,9	0,1	206,2	3,9	148,8
SO250_13-1	21.08.2016 00:56:47	Net (generic)	NET	information			max depth, SL max 5900m	f	46° 4,619' N	153° 58,193' E	8128,4	0,2	202,6	8,8	97,9
SO250_13-1	21.08.2016 04:44:13	Net (generic)	NET	information			MN an Deck	f	46° 4,620' N	153° 58,207' E	8134,1	0,3	208,8	7,6	334
SO250_13-1	21.08.2016 04:46:48	Net (generic)	NET	station end				f	46° 4,620' N	153° 58,209' E	8134,8	0,1	208,6	7,4	104,8
SO250_14-1	21.08.2016 06:25:37	Giant Box Corer	GKG	station start				f	45° 50,878' N	153° 47,992' E	8250,7	0,5	160,9	8,3	321,1
SO250_14-1	21.08.2016 06:27:48	Giant Box Corer	GKG	in the water			FW1 / SPW1	f	45° 50,879' N	153° 47,991' E	8250,1	0,3	161,5	8,7	108,5
SO250_14-1	21.08.2016 09:18:19	Giant Box Corer	GKG	max depth/on ground			SLmax 8324m	f	45° 50,879' N	153° 47,991' E	8250,9	0,8	184,5	8,7	349,9
SO250_14-1	21.08.2016 09:20:09	Giant Box Corer	GKG	hoisting			SZmax 107,9kN	f	45° 50,880' N	153° 47,992' E	8249,7	0,1	186,8	9,5	36,9
SO250_14-1	21.08.2016 13:50:04	Giant Box Corer	GKG	on deck				f	45° 50,871' N	153° 47,989' E	8250,9	0,2	175	8,1	104,5
SO250_14-1	21.08.2016 13:58:57	Giant Box Corer	GKG	station end				f	45° 50,870' N	153° 47,990' E	8250,9	0,3	178,3	10,2	176
SO250_15-1	21.08.2016 14:22:29	Multi Corer	MUC	station start				f	45° 50,876' N	153° 47,991' E	8250,3	0,5	154,8	9,9	341,8
SO250_15-1	21.08.2016 14:24:32	Multi Corer	MUC	in the water			FW1 / SPW1	f	45° 50,874' N	153° 47,991' E	8248,4	0,3	155,7	8,8	329,1
SO250_15-1	21.08.2016 16:48:57	Multi Corer	MUC	max depth/on ground			SLmax 8322m	f	45° 50,875' N	153° 47,975' E	8254,7	0,7	172,2	8,2	200,7
SO250_15-1	21.08.2016 16:49:11	Multi Corer	MUC	hoisting			SZmax 91,4kN	f	45° 50,875' N	153° 47,975' E	8248,5	1,2	168,5	7,9	41,3
SO250_15-1	21.08.2016 20:30:14	Multi Corer	MUC	on deck				f	45° 50,870' N	153° 47,997' E	8248,8	0,3	152,4	4,3	66,8
SO250_15-1	21.08.2016 20:30:36	Multi Corer	MUC	station end				f	45° 50,870' N	153° 47,998' E	8248,9	0,1	183,1	6,3	63,2
SO250_16-1	21.08.2016 20:48:00	Multi Corer	MUC	station start				f	45° 50,876' N	153° 47,994' E	8250,4	0,4	175	4,7	266,8
SO250_16-1	21.08.2016 20:50:14	Multi Corer	MUC	in the water			FW1 / SPW1	f	45° 50,879' N	153° 47,992' E	8254,1	0,2	155,6	4,4	295,6
SO250_16-1	21.08.2016 23:15:19	Multi Corer	MUC	max depth/on ground			BoKo 8309m SL max 8320m	f	45° 50,877' N	153° 47,996' E	8255,2	0,2	152,3	2	71
SO250_16-1	21.08.2016 23:18:37	Multi Corer	MUC	hoisting			SZ max 92,1 kN	f	45° 50,880' N	153° 47,993' E	8276,6	0,6	182,7	3,2	83,3
SO250_16-1	22.08.2016 03:13:57	Multi Corer	MUC	on deck				f	45° 50,873' N	153° 47,999' E	0	0,1	174,1	2,6	83,1
SO250_16-1	22.08.2016 03:15:22	Multi Corer	MUC	station end				f	45° 50,873' N	153° 47,997' E	0	0,4	169,6	6,1	270,5
SO250_17-1	22.08.2016 04:12:06	EpiBenthic Sledge	EBS	station start				f	45° 54,160' N	153° 54,685' E	7994	0,8	162,2	11,8	217,5
SO250_17-1	22.08.2016 04:14:16	EpiBenthic Sledge	EBS	in the water			FW1 / SPW1	f	45° 54,160' N	153° 54,681' E	7999,8	0,4	164,8	11,6	317,4
SO250_17-1	22.08.2016 07:32:07	EpiBenthic Sledge	EBS	information			BoKo SL 9270m	f	45° 52,036' N	153° 51,390' E	8185,7	0,8	161,3	11,5	226,5
SO250_17-1	22.08.2016 07:32:38	EpiBenthic Sledge	EBS	information			Auslegen, rwK 227°, d 0,77nm	f	45° 52,031' N	153° 51,381' E	8189,8	1,6	156	13,5	204,9
SO250_17-1	22.08.2016 08:20:13	EpiBenthic Sledge	EBS	max depth/on ground			SL max 11100m, Start Schleppe	f	45° 51,514' N	153° 50,581' E	8182,7	1	162,5	14	226,1
SO250_17-1	22.08.2016 08:32:37	EpiBenthic Sledge	EBS	hoisting				f	45° 51,401' N	153° 50,406' E	8184,5	0,4	169,4	13,9	201,4
SO250_17-1	22.08.2016 09:55:54	EpiBenthic Sledge	EBS	information			frei vom Grund, SL 8995m, SZmax 9	f	45° 51,401' N	153° 50,406' E	8183,7	0,4	174,3	11,5	32,6
SO250_17-1	22.08.2016 14:48:57	EpiBenthic Sledge	EBS	on deck				f	45° 51,401' N	153° 50,406' E	8187,2	0,2	177,4	12,4	24,4
SO250_17-1	22.08.2016 14:54:11	EpiBenthic Sledge	EBS	station end				f	45° 51,401' N	153° 50,406' E	8184,4	0,1	182,7	9,2	34,3
SO250_18-1	22.08.2016 16:06:32	Agassiz Trawl	AGT	station start				f	45° 47,459' N	153° 44,302' E	8110,4	0,8	169,9	10,3	203,3
SO250_18-1	22.08.2016 16:08:56	Agassiz Trawl	AGT	in the water			FW1 / SPW1, rwK 047°, d 9,90r	f	45° 47,454' N	153° 44,301' E	8110,8	0,1	162,9	12	100,5
SO250_18-1	22.08.2016 21:11:15	Agassiz Trawl	AGT	information			BoKo SL 8678m	f	45° 50,861' N	153° 49,568' E	8200,3	0,9	188,3	13,6	45,2
SO250_18-1	22.08.2016 21:11:22	Agassiz Trawl	AGT	information			Auslegen, rwK 047°, d 1,33nm	f	45° 50,862' N	153° 49,570' E	8200,3	0,8	182,8	12,2	48,5
SO250_18-1	22.08.2016 22:33:43	Agassiz Trawl	AGT	max depth/on ground			SLmax 10994m, Start Schleppe	f	45° 51,792' N	153° 51,011' E	8183,7	1,3	181,1	8,9	54,3
SO250_18-1	22.08.2016 22:48:56	Agassiz Trawl	AGT	hoisting				f	45° 51,957' N	153° 51,263' E	8178,9	0,2	181,1	9,2	21,1
SO250_18-1	22.08.2016 23:57:29	Agassiz Trawl	AGT	information			frei vom Grund, SL 9169 m, SZmax 9	f	45° 51,954' N	153° 51,259' E	8185,2	0,4	180,4	10,2	296,9
SO250_18-1	23.08.2016 05:09:47	Agassiz Trawl	AGT	on deck				f	45° 51,954' N	153° 51,263' E	8189,4	1,1	175,9	12,2	212,6
SO250_18-1	23.08.2016 05:11:23	Agassiz Trawl	AGT	station end				f	45° 51,953' N	153° 51,262' E	8197,3	0,9	172,9	12,2	241,4
SO250_19-1	23.08.2016 05:44:29	EpiBenthic Sledge	EBS	station start				f	45° 54,216' N	153° 54,562' E	7973,2	0,2	189,9	10,9	338,5
SO250_19-1	23.08.2016 05:47:50	EpiBenthic Sledge	EBS	in the water			FW1 / SPW1	f	45° 54,223' N	153° 54,562' E	7961,9	0,3	179,7	11,4	173,8
SO250_19-1	23.08.2016 09:07:00	EpiBenthic Sledge	EBS	information			BoKo SL 9213m	f	45° 52,023' N	153° 51,156' E	8192,7	0,7	167,5	12	210,7
SO250_19-1	23.08.2016 09:07:31	EpiBenthic Sledge	EBS	information			Auslegen, rwK 227°, d 0,68nm	f	45° 52,017' N	153° 51,147' E	8192,9	0,9	165,7	13,8	230,6
SO250_19-1	23.08.2016 09:51:22	EpiBenthic Sledge	EBS	max depth/on ground			SLmax 11000m, Start Schleppe	f	45° 51,566' N	153° 50,451' E	8188,6	0,8	172	13,2	231,1
SO250_19-1	23.08.2016 10:06:18	EpiBenthic Sledge	EBS	hoisting				f	45° 51,418' N	153° 50,215' E	8187,5	0,4	173,6	14,7	188,8

Station	Date / Time UTC	Device	Device Abbreviation	Action	Comment (Station)	Comment (Device Op)	Comment (Action)	Expedition Fixed	Latitude	Longitude	Depth (m)	Speed (kn)	Wind Dir	Wind speed (m/s)	Course
SO250_19-1	23.08.2016 11:27:56	EpiBenthic Sledge	EBS	information			frei vom Grund, SL 8899 m, SZmax 9	f	45° 51,412' N	153° 50,215' E	8187	0,2	169,8	12,9	89,8
SO250_19-1	23.08.2016 17:02:10	EpiBenthic Sledge	EBS	on deck				f	45° 51,424' N	153° 50,237' E	8186,9	0,2	182,7	13	198,3
SO250_19-1	23.08.2016 17:03:25	EpiBenthic Sledge	EBS	station end				f	45° 51,424' N	153° 50,236' E	8185,7	0,5	179	12,1	10,7
SO250_20-1	23.08.2016 18:19:46	Agassiz Trawl	AGT	station start				f	45° 47,580' N	153° 44,272' E	8111,3	0,6	194,4	11,2	119,6
SO250_20-1	23.08.2016 18:19:54	Agassiz Trawl	AGT	in the water			FW1 / SPW1, d 5,6nm	f	45° 47,580' N	153° 44,273' E	8117,1	1	193,8	12,3	85,7
SO250_20-1	24.08.2016 00:01:54	Agassiz Trawl	AGT	information			BoKo SL 9388m	f	45° 51,327' N	153° 50,083' E	8191,4	1,6	196,1	12,2	39,3
SO250_20-1	24.08.2016 00:02:55	Agassiz Trawl	AGT	information			Auslegen, rwK 042°, d 1,3nm	f	45° 51,337' N	153° 50,099' E	8190,5	0,5	201,6	12,2	22,6
SO250_20-1	24.08.2016 01:18:18	Agassiz Trawl	AGT	max depth/on ground			SLmax 11523 m, Start Schleppe	f	45° 52,105' N	153° 51,287' E	8191,1	1,1	200,8	14,2	61,1
SO250_20-1	24.08.2016 01:28:40	Agassiz Trawl	AGT	hoisting				f	45° 52,201' N	153° 51,439' E	8193,8	0,5	192,3	14,8	38,5
SO250_20-1	24.08.2016 03:13:43	Agassiz Trawl	AGT	information			frei vom Grund, SL 8872m, SZmax 9	f	45° 52,203' N	153° 51,435' E	8199,3	0,5	191,7	13,2	280,1
SO250_20-1	24.08.2016 07:59:45	Agassiz Trawl	AGT	on deck				f	45° 52,221' N	153° 51,501' E	8193,2	1,4	196,1	11,7	42,1
SO250_20-1	24.08.2016 07:59:54	Agassiz Trawl	AGT	station end				f	45° 52,224' N	153° 51,505' E	8193,2	1,8	194,3	11	46
SO250_21-1	24.08.2016 13:09:28	CTD	CTD	station start			clean ship	f	45° 57,737' N	152° 39,916' E	5958	0,2	228	6,6	57,3
SO250_21-1	24.08.2016 13:12:14	CTD	CTD	in the water			EL 2	f	45° 57,738' N	152° 39,921' E	5958,9	0,6	221,8	7,3	125,6
SO250_21-1	24.08.2016 13:41:12	CTD	CTD	max depth/on ground			SL max 1000m	f	45° 57,743' N	152° 39,914' E	5958,3	0,3	227,4	7,5	88,9
SO250_21-1	24.08.2016 13:42:53	CTD	CTD	hoisting				f	45° 57,742' N	152° 39,914' E	5959	0,6	227,6	7,8	143,4
SO250_21-1	24.08.2016 14:08:53	CTD	CTD	on deck				f	45° 57,738' N	152° 39,902' E	5960,6	0,3	225,6	7,1	314,6
SO250_21-1	24.08.2016 14:10:45	CTD	CTD	station end				f	45° 57,738' N	152° 39,903' E	5962,4	0,2	219,3	7,5	354,2
SO250_22-1	24.08.2016 14:28:43	KONGSBERG EM122	EM122	station start				f	45° 56,150' N	152° 38,885' E	5305,3	6	230,4	7,3	161,2
SO250_22-1	24.08.2016 14:32:43	KONGSBERG EM122	EM122	profile start				f	45° 56,035' N	152° 39,334' E	5377,3	4,7	221,8	5,6	54,6
SO250_22-1	24.08.2016 15:09:27	KONGSBERG EM122	EM122	alter course			rwK: 310°, d: 1,8nm	f	45° 58,539' N	152° 42,415' E	5998,1	3,1	232	4,8	36,2
SO250_22-1	24.08.2016 16:02:20	KONGSBERG EM122	EM122	alter course			rwK: 220°, d: 4,0nm	f	46° 0,254' N	152° 40,936' E	5466,8	2,5	224,5	4,5	238,1
SO250_22-1	24.08.2016 16:46:10	KONGSBERG EM122	EM122	profile end				f	45° 57,164' N	152° 37,312' E	5922,6	6,5	200,9	4,6	216,4
SO250_22-1	24.08.2016 16:46:14	KONGSBERG EM122	EM122	station end				f	45° 57,158' N	152° 37,306' E	5922,6	5,8	204,5	3,6	224,1
SO250_23-1	24.08.2016 17:19:05	Net (generic)	NET	station start			clean ship	f	45° 57,728' N	152° 39,846' E	5960,4	0,9	184,2	6,6	242,7
SO250_23-1	24.08.2016 17:27:00	Net (generic)	NET	information			zu Wasser, EL2	f	45° 57,724' N	152° 39,836' E	5959,2	0,2	192,6	6,2	92,6
SO250_23-1	24.08.2016 19:40:54	Net (generic)	NET	information			max depth, SLmax 5900m	f	45° 57,722' N	152° 39,840' E	5959,1	0,3	192,6	6,7	156,8
SO250_23-1	24.08.2016 23:19:06	Net (generic)	NET	information			Gerät a/D	f	45° 57,715' N	152° 39,841' E	5960,5	0	185,4	6,4	89
SO250_23-1	24.08.2016 23:26:06	Net (generic)	NET	station end				f	45° 57,799' N	152° 39,906' E	5961,3	1,4	187,4	6,3	42,5
SO250_24-1	25.08.2016 00:23:55	Giant Box Corer	GKG	station start				f	45° 55,263' N	152° 47,539' E	6064,2	1	158,6	7	314,2
SO250_24-1	25.08.2016 00:25:10	Giant Box Corer	GKG	in the water			FW1 / SPW1	f	45° 55,271' N	152° 47,536' E	6066,9	0,3	158,6	8	138,3
SO250_24-1	25.08.2016 02:04:04	Giant Box Corer	GKG	max depth/on ground			SLmax 6115m	f	45° 55,230' N	152° 47,468' E	6065,4	0,5	165,7	6,8	133,1
SO250_24-1	25.08.2016 02:08:05	Giant Box Corer	GKG	hoisting			SZmax 90,4 kN	f	45° 55,230' N	152° 47,467' E	6064,9	0,3	168,3	6,6	314
SO250_24-1	25.08.2016 04:19:42	Giant Box Corer	GKG	on deck				f	45° 55,237' N	152° 47,467' E	6067,3	0,4	171,4	9	169,4
SO250_24-1	25.08.2016 04:28:22	Giant Box Corer	GKG	station end				f	45° 55,237' N	152° 47,467' E	6068,4	0,2	166,9	7,6	306
SO250_25-1	25.08.2016 04:45:03	Giant Box Corer	GKG	station start				f	45° 55,221' N	152° 47,470' E	6066,4	0,5	171,9	7,9	116,1
SO250_25-1	25.08.2016 04:47:03	Giant Box Corer	GKG	in the water			FW1 / SPW1	f	45° 55,222' N	152° 47,471' E	6064,8	0,2	177,7	7,6	17,1
SO250_25-1	25.08.2016 07:33:57	Giant Box Corer	GKG	max depth/on ground			SLmax 6110m	f	45° 55,235' N	152° 47,464' E	6067,7	0,5	172,2	10,9	334,3
SO250_25-1	25.08.2016 07:34:40	Giant Box Corer	GKG	hoisting			SZmax 80,0kN	f	45° 55,237' N	152° 47,465' E	6069,9	0,4	165,5	10	337,1
SO250_25-1	25.08.2016 11:14:54	Giant Box Corer	GKG	on deck				f	45° 55,236' N	152° 47,464' E	6065,9	0,2	160,3	12,4	124,5
SO250_25-1	25.08.2016 11:18:08	Giant Box Corer	GKG	station end				f	45° 55,236' N	152° 47,465' E	6065,1	0,2	158,5	12,4	236,8
SO250_26-1	25.08.2016 11:42:17	Multi Corer	MUC	station start				f	45° 55,234' N	152° 47,469' E	6064,8	0,1	163,5	12,8	348,1
SO250_26-1	25.08.2016 11:52:57	Multi Corer	MUC	in the water			FW1 / SPW1	f	45° 55,233' N	152° 47,474' E	6067,1	0,2	169	13,3	148,2
SO250_26-1	25.08.2016 13:40:19	Multi Corer	MUC	max depth/on ground			SLmax 6105m	f	45° 55,226' N	152° 47,468' E	6065	0,2	172,7	10,6	284,7
SO250_26-1	25.08.2016 13:40:36	Multi Corer	MUC	hoisting			SZmax 67,2 kN	f	45° 55,226' N	152° 47,468' E	6064,8	0,2	174,7	10,1	97,2
SO250_26-1	25.08.2016 16:25:51	Multi Corer	MUC	on deck				f	45° 55,224' N	152° 47,472' E	6064,9	0,3	167,4	11,4	143,6
SO250_26-1	25.08.2016 16:29:03	Multi Corer	MUC	station end				f	45° 55,221' N	152° 47,474' E	6063,8	0,6	168	11,1	138,6
SO250_27-1	25.08.2016 16:44:40	Multi Corer	MUC	station start				f	45° 55,228' N	152° 47,466' E	6065,4	0	167,9	10,4	164
SO250_27-1	25.08.2016 16:46:14	Multi Corer	MUC	in the water			FW1 / SPW1	f	45° 55,227' N	152° 47,466' E	6064,6	0,2	167,2	11,9	147,1

Station	Date / Time UTC	Device	Device Abbreviation	Action	Comment (Station)	Comment (Device Op)	Comment (Action)	Expedition Fixed	Latitude	Longitude	Depth (m)	Speed (kn)	Wind Dir	Wind speed (m/s)	Course
SO250_27-1	25.08.2016 18:37:36	Multi Corer	MUC	max depth/on ground			SLmax: 6106m	f	45° 55,236' N	152° 47,466' E	6065,4	0,1	164,4	11,2	100,3
SO250_27-1	25.08.2016 18:38:02	Multi Corer	MUC	hoisting			SZmax: 66,9kN	f	45° 55,237' N	152° 47,466' E	6065,3	0,6	163,5	10,5	128,8
SO250_27-1	25.08.2016 21:46:52	Multi Corer	MUC	on deck				f	45° 55,466' N	152° 48,565' E	6092,5	1,3	170,3	10,5	37,1
SO250_27-1	25.08.2016 21:49:16	Multi Corer	MUC	station end				f	45° 55,483' N	152° 48,643' E	6095,3	1,6	171,3	11,5	83,4
SO250_28-1	25.08.2016 22:33:19	EpiBenthic Sledge	EBS	station start				f	45° 55,757' N	152° 50,177' E	6118,7	0,7	173,4	11,5	231,2
SO250_28-1	25.08.2016 22:36:42	EpiBenthic Sledge	EBS	in the water			SPW 1/ FW 1	f	45° 55,707' N	152° 50,124' E	6116,9	1,2	176,8	11,9	218,2
SO250_28-1	26.08.2016 01:07:14	EpiBenthic Sledge	EBS	information			BoKo SL 6790m	f	45° 54,438' N	152° 47,025' E	6050,2	1	165,2	13,4	251,5
SO250_28-1	26.08.2016 01:07:42	EpiBenthic Sledge	EBS	information			Auslegen, rwK 240°, d 1,0nm	f	45° 54,434' N	152° 47,016' E	6045,1	1,1	168,3	13,7	235,3
SO250_28-1	26.08.2016 02:04:42	EpiBenthic Sledge	EBS	max depth/on ground			SLmax 9200 m, Start Schleppe	f	45° 53,959' N	152° 45,838' E	8086,7	1	179,9	12,5	228,9
SO250_28-1	26.08.2016 02:20:47	EpiBenthic Sledge	EBS	hoisting				f	45° 53,836' N	152° 45,538' E	7749,3	0,2	183,6	13,4	178,2
SO250_28-1	26.08.2016 03:00:00	EpiBenthic Sledge	EBS	information			EBS harkt, SZmax: 100kN, Schiff setzt lan	f	45° 53,838' N	152° 45,528' E	5947,2	0,4	171,4	11,8	144,5
SO250_28-1	26.08.2016 05:06:50	EpiBenthic Sledge	EBS	information			EBS frei vom Gund; SL: 6000 r	f	45° 54,520' N	152° 47,204' E	6047,1	0,1	167,6	13,6	104,1
SO250_28-1	26.08.2016 07:33:27	EpiBenthic Sledge	EBS	on deck				f	45° 54,506' N	152° 47,217' E	6046,9	0,3	178,1	13	146,6
SO250_28-1	26.08.2016 08:05:26	EpiBenthic Sledge	EBS	station end				f	45° 54,513' N	152° 47,209' E	6046,2	0,3	172,8	12,7	323,2
SO250_29-1	26.08.2016 08:53:18	Agassiz Trawl	AGT	in the water			FW1 / SPW1, rwK 096°, d 4,0n	f	45° 57,190' N	152° 47,072' E	0	0,3	161	11,7	349,7
SO250_29-1	26.08.2016 08:53:18	Agassiz Trawl	AGT	station start			FW1 / SPW1, rwK 096°, d	f	45° 57,191' N	152° 47,075' E	0	0,5	159,6	13,3	267
SO250_29-1	26.08.2016 12:50:12	Agassiz Trawl	AGT	information			BoKo 6735m	f	45° 56,731' N	152° 52,545' E	6183,1	1,4	165,7	11,9	108,5
SO250_29-1	26.08.2016 12:50:16	Agassiz Trawl	AGT	information			Auslegen, rwK 096°, d 1,3 nm	f	45° 56,731' N	152° 52,546' E	6185,9	0,9	168,5	12	85,9
SO250_29-1	26.08.2016 14:02:10	Agassiz Trawl	AGT	max depth/on ground			SLmax 9000m, Start Schleppe	f	45° 56,587' N	152° 54,251' E	6203,9	1,5	169,6	13	97,7
SO250_29-1	26.08.2016 14:14:09	Agassiz Trawl	AGT	hoisting				f	45° 56,565' N	152° 54,505' E	6202,5	0,1	162,2	12	98,6
SO250_29-1	26.08.2016 15:49:59	Agassiz Trawl	AGT	information			frei vom Grund, SL: 6580m, SZ: 60	f	45° 56,570' N	152° 54,499' E	6202,2	0,2	160	11,6	337,7
SO250_29-1	26.08.2016 19:29:33	Agassiz Trawl	AGT	on deck				f	45° 56,563' N	152° 54,506' E	6205,3	0,3	158,8	10,5	89,9
SO250_29-1	26.08.2016 19:30:55	Agassiz Trawl	AGT	station end				f	45° 56,560' N	152° 54,508' E	6205,8	0,1	165,5	8,9	227,8
SO250_30-1	26.08.2016 19:57:14	EpiBenthic Sledge	EBS	station start				f	45° 56,386' N	152° 56,701' E	6246,1	0,5	151,6	10,7	301,5
SO250_30-1	26.08.2016 20:13:59	EpiBenthic Sledge	EBS	in the water			FW1 / SPW1	f	45° 56,382' N	152° 56,685' E	6247,2	1	158,7	9,9	310
SO250_30-1	26.08.2016 21:00:00	EpiBenthic Sledge	EBS	information				f	45° 56,468' N	152° 55,593' E	6228,3	1,1	162,9	9,3	273,5
SO250_30-1	26.08.2016 23:30:30	EpiBenthic Sledge	EBS	information			BoKo SL 6920m	f	45° 56,720' N	152° 52,515' E	6182,6	1,3	159	11	247
SO250_30-1	26.08.2016 23:30:46	EpiBenthic Sledge	EBS	information			Auslegen, rwK 276°, d	f	45° 56,720' N	152° 52,509' E	6180,7	0,9	160,3	10	299
SO250_30-1	27.08.2016 00:26:34	EpiBenthic Sledge	EBS	max depth/on ground			SLmax 9200m, Start Schleppe	f	45° 56,821' N	152° 51,185' E	6168,1	1	165,6	9,2	253,1
SO250_30-1	27.08.2016 00:37:15	EpiBenthic Sledge	EBS	hoisting				f	45° 56,839' N	152° 50,954' E	6162,6	0,4	164,4	8,2	11,1
SO250_30-1	27.08.2016 02:30:25	EpiBenthic Sledge	EBS	information			frei vom Grund, SL 6400m, SZmax 9	f	45° 56,834' N	152° 50,943' E	6163,7	0,2	159,8	7,1	116
SO250_30-1	27.08.2016 05:31:01	EpiBenthic Sledge	EBS	on deck				f	45° 56,835' N	152° 50,945' E	6165,2	0,3	154,5	7,6	349,4
SO250_30-1	27.08.2016 05:33:31	EpiBenthic Sledge	EBS	station end				f	45° 56,838' N	152° 50,939' E	6165,1	0,2	154,1	7,8	175,8
SO250_31-1	27.08.2016 06:12:05	Agassiz Trawl	AGT	station start				f	45° 57,131' N	152° 47,039' E	6084,5	0,6	136,8	8,4	76,9
SO250_31-1	27.08.2016 06:15:11	Agassiz Trawl	AGT	in the water			FW1 / SPW1, rwK 096°, d 6,76r	f	45° 57,125' N	152° 47,111' E	6084,7	0,8	140,6	8,2	99,7
SO250_31-1	27.08.2016 10:15:12	Agassiz Trawl	AGT	information			BoKo SL 6706m	f	45° 56,688' N	152° 52,785' E	6184,5	1,1	149,1	7,6	111,9
SO250_31-1	27.08.2016 10:15:35	Agassiz Trawl	AGT	information			Auslegen, rwK 096°, d 1,0nm	f	45° 56,687' N	152° 52,795' E	6183,8	1,1	147,9	7,6	84
SO250_31-1	27.08.2016 11:17:54	Agassiz Trawl	AGT	max depth/on ground			SLmax 8500m, Start Schleppe	f	45° 56,573' N	152° 54,256' E	6201,7	0,8	160,8	3,9	104,7
SO250_31-1	27.08.2016 11:37:11	Agassiz Trawl	AGT	hoisting				f	45° 56,540' N	152° 54,669' E	6218,3	0,5	260,6	2	345,8
SO250_31-1	27.08.2016 12:58:42	Agassiz Trawl	AGT	information			frei vom Grund, SL6540 m, SZmax 8	f	45° 56,544' N	152° 54,667' E	6220,6	0,4	169	2,6	67,5
SO250_31-1	27.08.2016 15:58:54	Agassiz Trawl	AGT	on deck				f	45° 56,547' N	152° 54,662' E	6211,6	0,2	156,4	9,9	160,1
SO250_31-1	27.08.2016 15:59:03	Agassiz Trawl	AGT	station end				f	45° 56,547' N	152° 54,662' E	6211,6	0,2	155,1	9	96,2
SO250_32-1	27.08.2016 17:53:16	CTD	CTD	station start			clean ship	f	45° 41,582' N	152° 49,499' E	6038,3	0,7	135,3	9,3	235,7
SO250_32-1	27.08.2016 17:55:48	CTD	CTD	in the water			EL 2	f	45° 41,581' N	152° 49,500' E	6038,9	0,1	135,2	9,2	316,6
SO250_32-1	27.08.2016 18:24:35	CTD	CTD	max depth/on ground			SLmax 1000m	f	45° 41,576' N	152° 49,491' E	6040,1	0,2	131	9,5	253,1
SO250_32-1	27.08.2016 18:28:51	CTD	CTD	hoisting				f	45° 41,579' N	152° 49,501' E	6032,3	0,1	131,5	7,6	223,2
SO250_32-1	27.08.2016 18:50:38	CTD	CTD	on deck				f	45° 41,578' N	152° 49,503' E	6030,5	0,2	134,6	8,3	295,3
SO250_32-1	27.08.2016 18:52:17	CTD	CTD	station end				f	45° 41,577' N	152° 49,508' E	6024,8	0	133,6	7,8	157,6
SO250_33-1	27.08.2016 19:20:05	KONGSBERG EM122	EM122	station start				f	45° 40,457' N	152° 46,135' E	6000,8	10,6	141,9	8,1	272,4

Station	Date / Time UTC	Device	Device Abbreviation	Action	Comment (Station)	Comment (Device Op)	Comment (Action)	Expedition Fixed	Latitude	Longitude	Depth (m)	Speed (kn)	Wind Dir	Wind speed (m/s)	Course
SO250_33-1	27.08.2016 19:28:59	KONGSBERG EM122	EM122	profile start			rwK 051°, FüG 6kn	f	45° 41,240' N	152° 46,213' E	5771,7	5,9	154,3	9,1	45,8
SO250_33-1	27.08.2016 20:05:08	KONGSBERG EM122	EM122	alter course			auf 129°rw	f	45° 43,573' N	152° 50,235' E	5916,8	6,3	139,3	9,2	48,4
SO250_33-1	27.08.2016 20:34:06	KONGSBERG EM122	EM122	alter course			auf 222°rw	f	45° 42,626' N	152° 52,455' E	6207,9	4,5	136,2	7,9	135,9
SO250_33-1	27.08.2016 21:15:00	KONGSBERG EM122	EM122	profile end				f	45° 39,524' N	152° 48,941' E	6210	6,3	138,4	7	220,9
SO250_33-1	27.08.2016 21:15:05	KONGSBERG EM122	EM122	station end				f	45° 39,517' N	152° 48,933' E	6215,9	6,4	142,2	7,7	217,5
SO250_34-1	27.08.2016 21:38:03	Net (generic)	NET	station start			clean schip	f	45° 41,614' N	152° 49,528' E	7680,7	0,6	125,5	6,7	176,3
SO250_34-1	27.08.2016 21:48:20	Net (generic)	NET	information			Gerät z/W, EL 2	f	45° 41,584' N	152° 49,490' E	6042,2	0,6	119	6,6	255
SO250_34-1	28.08.2016 00:03:23	Net (generic)	NET	information			max depth, SLmax 5900m	f	45° 41,580' N	152° 49,500' E	6040,5	1,2	165,4	3,6	195,5
SO250_34-1	28.08.2016 03:41:28	Net (generic)	NET	information			Multi Net an Deck	f	45° 41,576' N	152° 49,503' E	6274,2	0,5	132,2	6,1	193,7
SO250_34-1	28.08.2016 03:42:25	Net (generic)	NET	station end				f	45° 41,576' N	152° 49,504' E	6046,5	0,2	125,8	5,1	104
SO250_35-1	28.08.2016 03:50:10	KONGSBERG EM122	EM122	station start			rwK: 122°, d: 5,21nm	f	45° 41,608' N	152° 49,264' E	6030,3	2,9	119	7,8	224,8
SO250_35-1	28.08.2016 04:50:26	KONGSBERG EM122	EM122	alter course			rwK: 133°, d: 4,29nm	f	45° 38,765' N	152° 56,010' E	7120,9	6,2	113,3	6,7	123,1
SO250_35-1	28.08.2016 05:31:10	KONGSBERG EM122	EM122	station end				f	45° 35,925' N	153° 0,322' E	7366,9	6,1	128,9	7,8	136,3
SO250_36-1	28.08.2016 06:14:00	Giant Box Corer	GKG	station start				f	45° 38,616' N	152° 55,917' E	7134,6	0,3	113,7	8,7	198,6
SO250_36-1	28.08.2016 06:15:00	Giant Box Corer	GKG	in the water			FW1 / SPW1	f	45° 38,613' N	152° 55,913' E	7134,6	0,2	112,5	8,1	163,3
SO250_36-1	28.08.2016 08:40:37	Giant Box Corer	GKG	max depth/on ground			SLmax 7189m	f	45° 38,610' N	152° 55,921' E	7134,6	0	112,4	9,2	108,8
SO250_36-1	28.08.2016 08:42:07	Giant Box Corer	GKG	hoisting			SZmax 81,8 kN	f	45° 38,609' N	152° 55,921' E	7135,3	0,2	114,1	9,3	102,3
SO250_36-1	28.08.2016 12:08:46	Giant Box Corer	GKG	on deck				f	45° 38,609' N	152° 55,916' E	7134,7	0,4	111,8	9,4	108,5
SO250_36-1	28.08.2016 12:14:51	Giant Box Corer	GKG	station end				f	45° 38,605' N	152° 55,916' E	7137,5	0,2	115,3	9,5	205,9
SO250_37-1	28.08.2016 12:17:08	Giant Box Corer	GKG	station start				f	45° 38,605' N	152° 55,918' E	7133,7	0,4	109,7	10,1	348,7
SO250_37-1	28.08.2016 12:31:48	Giant Box Corer	GKG	in the water			FW1/SPW1	f	45° 38,604' N	152° 55,904' E	7133,9	0,2	116,3	7,8	259,5
SO250_37-1	28.08.2016 14:52:54	Giant Box Corer	GKG	max depth/on ground			SLmax 7188m	f	45° 38,604' N	152° 55,911' E	7135,5	0,3	99,9	9	298,9
SO250_37-1	28.08.2016 14:53:22	Giant Box Corer	GKG	hoisting			SZmax 88,6kN	f	45° 38,605' N	152° 55,910' E	7136	0,5	103,4	9,5	308,6
SO250_37-1	28.08.2016 18:22:19	Giant Box Corer	GKG	on deck				f	45° 38,611' N	152° 55,903' E	7134,1	0,5	103,3	9,6	339,6
SO250_37-1	28.08.2016 18:41:18	Giant Box Corer	GKG	station end				f	45° 38,603' N	152° 55,915' E	7136,5	0,3	94,2	7,7	86,8
SO250_38-1	28.08.2016 18:42:09	Multi Corer	MUC	station start				f	45° 38,604' N	152° 55,916' E	7137,6	0,2	96,2	8,5	180,8
SO250_38-1	28.08.2016 18:44:24	Multi Corer	MUC	in the water			FW1 / SPW1	f	45° 38,605' N	152° 55,917' E	7134,4	0,2	91,3	8,1	68,5
SO250_38-1	28.08.2016 20:56:10	Multi Corer	MUC	max depth/on ground			SLmax 7198m	f	45° 38,609' N	152° 55,905' E	7133,6	0,2	101,7	10,1	214,4
SO250_38-1	28.08.2016 21:00:39	Multi Corer	MUC	hoisting			SZmax 80,7kN	f	45° 38,610' N	152° 55,914' E	7136,7	0,3	99,4	8,8	108,6
SO250_38-1	29.08.2016 00:16:29	Multi Corer	MUC	on deck				f	45° 38,610' N	152° 55,921' E	7136,7	0,1	95	8,4	115,8
SO250_38-1	29.08.2016 00:19:04	Multi Corer	MUC	station end				f	45° 38,608' N	152° 55,919' E	7136,1	0,3	96,2	8,1	75,8
SO250_38-1	29.08.2016 00:19:04	Multi Corer	MUC	station end				f	45° 38,608' N	152° 55,919' E	7136,1	0	100	8,2	188
SO250_39-1	29.08.2016 00:41:08	Multi Corer	MUC	station start				f	45° 38,609' N	152° 55,922' E	7136,6	0,2	100,3	10	180,1
SO250_39-1	29.08.2016 00:43:24	Multi Corer	MUC	in the water			FW1/SPW 1	f	45° 38,610' N	152° 55,918' E	7136,9	0,2	96,2	10,1	138,6
SO250_39-1	29.08.2016 02:43:45	Multi Corer	MUC	max depth/on ground			SLmax 7193m	f	45° 38,609' N	152° 55,923' E	7134,6	0,5	97,5	9,3	23,8
SO250_39-1	29.08.2016 02:53:08	Multi Corer	MUC	hoisting			SZmax 76,8kN	f	45° 38,614' N	152° 55,916' E	7135,8	0,3	94,8	9,6	172,7
SO250_39-1	29.08.2016 05:33:33	Multi Corer	MUC	on deck				f	45° 38,609' N	152° 55,914' E	7134,8	0,5	89,7	9,9	65,1
SO250_39-1	29.08.2016 05:35:54	Multi Corer	MUC	station end				f	45° 38,608' N	152° 55,918' E	7133,8	0,5	88,5	9,7	318,1
SO250_40-1	29.08.2016 06:12:03	EpiBenthic Sledge	EBS	station start				f	45° 38,001' N	152° 52,003' E	6835	0,2	93,3	10,9	243,6
SO250_40-1	29.08.2016 06:14:34	EpiBenthic Sledge	EBS	in the water			FW1 / SPW1	f	45° 38,006' N	152° 52,013' E	6839	0,4	95,6	8,4	352,7
SO250_40-1	29.08.2016 09:39:40	EpiBenthic Sledge	EBS	information			BoKo SL 7744m	f	45° 39,976' N	152° 55,953' E	7300,3	1,8	69,1	9,1	42,5
SO250_40-1	29.08.2016 09:39:41	EpiBenthic Sledge	EBS	information			Auslegen, rwK 055°, d 1,22nm	f	45° 39,976' N	152° 55,953' E	7300,3	1,6	72,5	9,1	40,3
SO250_40-1	29.08.2016 10:53:09	EpiBenthic Sledge	EBS	max depth/on ground			SLmax 10600m, Start Schleppe	f	45° 40,686' N	152° 57,374' E	7060,3	0,8	78	8	78,4
SO250_40-1	29.08.2016 11:10:35	EpiBenthic Sledge	EBS	hoisting				f	45° 40,838' N	152° 57,678' E	7052,1	0,9	72,5	8,3	196,7
SO250_40-1	29.08.2016 13:12:31	EpiBenthic Sledge	EBS	information			frei vom Grund, SL 7500m ,SZmax 1(	f	45° 40,839' N	152° 57,687' E	7055,2	0,3	81,4	9	95,7
SO250_40-1	29.08.2016 16:06:23	EpiBenthic Sledge	EBS	on deck				f	45° 40,837' N	152° 57,673' E	7061,4	0,3	94,6	8,5	195,7
SO250_40-1	29.08.2016 16:23:36	EpiBenthic Sledge	EBS	station end				f	45° 40,835' N	152° 57,687' E	7046,2	0,1	88	8	301,4
SO250_41-1	29.08.2016 17:19:19	Agassiz Trawl	AGT	station start				f	45° 36,500' N	152° 51,501' E	6946	1,1	91,8	9,4	153,4
SO250_41-1	29.08.2016 17:24:16	Agassiz Trawl	AGT	in the water			FW1 / SPW1, rwK 053°, d 8,33r	f	45° 36,523' N	152° 51,534' E	6957,1	0,7	81,7	8,3	41,7

Station	Date / Time UTC	Device	Device Abbreviation	Action	Comment (Station)	Comment (Device Op)	Comment (Action)	Expedition Fixed	Latitude	Longitude	Depth (m)	Speed (kn)	Wind Dir	Wind speed (m/s)	Course
SO250_41-1	29.08.2016 21:55:26	Agassiz Trawl	AGT	information			BoKo SL 7995m	f	45° 39,232' N	152° 56,687' E	7154,4	1,7	106,8	8,3	39,9
SO250_41-1	29.08.2016 21:55:30	Agassiz Trawl	AGT	information			Auslegen, rwK 053°, d 1,3nm	f	45° 39,232' N	152° 56,688' E	7154,4	0,3	103,9	6,8	110,5
SO250_41-1	29.08.2016 23:12:12	Agassiz Trawl	AGT	information			SLmax 10200m, Start Schleppe	f	45° 39,999' N	152° 58,146' E	7180,2	1,2	74,4	7,6	40,3
SO250_41-1	29.08.2016 23:24:37	Agassiz Trawl	AGT	hoisting				f	45° 40,113' N	152° 58,364' E	7159,7	0,3	91,4	6,7	110,6
SO250_41-1	30.08.2016 00:45:26	Agassiz Trawl	AGT	information			frei vom Grund,SL 7980m, SZmax 9	f	45° 40,114' N	152° 58,366' E	7163,9	1	75,6	8	206,3
SO250_41-1	30.08.2016 04:04:05	Agassiz Trawl	AGT	on deck				f	45° 40,115' N	152° 58,359' E	7162,4	0,3	85,6	8,3	61,1
SO250_41-1	30.08.2016 04:06:31	Agassiz Trawl	AGT	station end				f	45° 40,112' N	152° 58,351' E	7163,2	1,5	80,9	8	216,3
SO250_42-1	30.08.2016 04:51:05	EpiBenthic Sledge	EBS	station start				f	45° 37,602' N	152° 52,499' E	6881,4	0,5	72,2	8	37,5
SO250_42-1	30.08.2016 04:53:57	EpiBenthic Sledge	EBS	in the water			FW1 / SPW1	f	45° 37,605' N	152° 52,504' E	6886,8	0,1	80	8,4	56,1
SO250_42-1	30.08.2016 08:18:01	EpiBenthic Sledge	EBS	information			BoKo SL 7890m	f	45° 39,620' N	152° 56,391' E	7110,6	0,7	64,6	7,9	39,6
SO250_42-1	30.08.2016 08:18:39	EpiBenthic Sledge	EBS	information			Auslegen, rwK 054°, d 0,93nm	f	45° 39,626' N	152° 56,403' E	7110	1,1	66	6,7	71,7
SO250_42-1	30.08.2016 09:13:50	EpiBenthic Sledge	EBS	max depth/on ground			SLmax 10000m, Start Schleppe	f	45° 40,173' N	152° 57,457' E	7121,8	0,7	72,2	8,1	35,8
SO250_42-1	30.08.2016 09:24:26	EpiBenthic Sledge	EBS	hoisting				f	45° 40,266' N	152° 57,646' E	7117,6	0,7	73,9	9,3	48,6
SO250_42-1	30.08.2016 11:02:13	EpiBenthic Sledge	EBS	information			frei vom Grund, SL 7499m , SZmax 9	f	45° 40,263' N	152° 57,638' E	7119,6	0,5	80,2	8	286,4
SO250_42-1	30.08.2016 13:42:41	EpiBenthic Sledge	EBS	on deck				f	45° 40,266' N	152° 57,639' E	7121,2	0,7	74,4	7,4	40,3
SO250_42-1	30.08.2016 13:43:29	EpiBenthic Sledge	EBS	station end				f	45° 40,266' N	152° 57,640' E	7119,1	0,7	72,4	6,4	227,5
SO250_43-1	30.08.2016 15:14:16	Agassiz Trawl	AGT	station start				f	45° 35,999' N	152° 52,007' E	7077,8	0,6	75,1	7,1	132,6
SO250_43-1	30.08.2016 15:16:47	Agassiz Trawl	AGT	in the water			FW1 / SPW1, rwK 053°, d 8,292	f	45° 36,018' N	152° 52,034' E	7288	1,2	81,1	7,9	78,6
SO250_43-1	30.08.2016 19:26:26	Agassiz Trawl	AGT	information			BoKo SL 8039	f	45° 38,514' N	152° 56,775' E	7241,1	1,3	68,1	6	43,8
SO250_43-1	30.08.2016 19:26:29	Agassiz Trawl	AGT	information			Auslegen, rwK 053°, d 1,07nm	f	45° 38,515' N	152° 56,776' E	7245,4	0,6	63,3	5,4	74,1
SO250_43-1	30.08.2016 20:32:38	Agassiz Trawl	AGT	max depth/on ground			SLmax 10000m, Start Schleppe	f	45° 39,176' N	152° 58,034' E	7255,5	0,9	61,1	6,6	55
SO250_43-1	30.08.2016 20:52:06	Agassiz Trawl	AGT	hoisting				f	45° 39,362' N	152° 58,382' E	7244,2	0,5	60,9	5,3	133,1
SO250_43-1	30.08.2016 22:34:29	Agassiz Trawl	AGT	information			frei vom Grund, SL 7584m, SZmax 1	f	45° 39,358' N	152° 58,377' E	7245,4	0,7	60,8	7,7	36,3
SO250_43-1	31.08.2016 02:05:27	Agassiz Trawl	AGT	on deck				f	45° 39,355' N	152° 58,388' E	7498,9	0,5	78,7	5	193,7
SO250_43-1	31.08.2016 02:06:38	Agassiz Trawl	AGT	station end				f	45° 39,335' N	152° 58,376' E	7246,9	1,7	72,1	4,9	207,1
SO250_44-1	31.08.2016 03:06:11	CTD	CTD	station start			clean ship	f	45° 31,354' N	153° 2,822' E	7805	0,1	81,5	5,5	87,8
SO250_44-1	31.08.2016 03:08:07	CTD	CTD	in the water			EL2	f	45° 31,356' N	153° 2,826' E	7793,6	0,2	73,7	5,4	219,6
SO250_44-1	31.08.2016 03:49:45	CTD	CTD	max depth/on ground			SLmax 1500m	f	45° 31,356' N	153° 2,821' E	7757,6	0,2	70,6	6,8	83,2
SO250_44-1	31.08.2016 03:50:21	CTD	CTD	hoisting				f	45° 31,356' N	153° 2,821' E	7760,1	0,1	73	6,8	52,8
SO250_44-1	31.08.2016 04:25:30	CTD	CTD	on deck				f	45° 31,352' N	153° 2,834' E	7757,8	0,6	78,2	5,5	236
SO250_44-1	31.08.2016 04:26:08	CTD	CTD	station end				f	45° 31,352' N	153° 2,832' E	7751,8	0,3	80,8	4,9	253
SO250_44-1	31.08.2016 04:28:19	CTD	CTD	information				f	45° 31,333' N	153° 2,799' E	7754,1	0,8	75,4	6,4	224,4
SO250_45-1	31.08.2016 04:57:30	KONGSBERG EM122	EM122	station start			rwK 225°, FüG 6kn	f	45° 34,239' N	153° 3,721' E	7822,4	5,4	87,2	4,7	228,8
SO250_45-1	31.08.2016 05:42:17	KONGSBERG EM122	EM122	alter course			auf 104°rw	f	45° 31,299' N	152° 59,502' E	7633,4	3,3	92,1	5,7	224,3
SO250_45-1	31.08.2016 06:42:12	KONGSBERG EM122	EM122	alter course			auf 036°rw	f	45° 29,795' N	153° 6,926' E	8518	5,1	92,5	4,4	102,5
SO250_45-1	31.08.2016 07:22:11	KONGSBERG EM122	EM122	profile end				f	45° 32,877' N	153° 10,303' E	8517,2	6,2	94,3	5,8	36,9
SO250_45-1	31.08.2016 07:22:13	KONGSBERG EM122	EM122	station end				f	45° 32,880' N	153° 10,306' E	8517,2	6,1	85,1	5,5	32,5
SO250_46-1	31.08.2016 08:07:21	Net (generic)	NET	station start			clean ship	f	45° 31,334' N	153° 2,913' E	6377,6	1,3	61,9	5,9	198,3
SO250_46-1	31.08.2016 08:10:06	Net (generic)	NET	information			Gerät z/W, EL 2	f	45° 31,323' N	153° 2,923' E	8592,9	0,5	72,5	5,3	200,2
SO250_46-1	31.08.2016 10:28:02	Net (generic)	NET	information			max depth, SLmax 5900m	f	45° 31,317' N	153° 2,939' E	7787,8	0,4	68,6	4,6	231
SO250_46-1	31.08.2016 13:38:58	Net (generic)	NET	information			Gerät an Deck	f	45° 31,311' N	153° 2,943' E	7791,1	0,2	64,2	4,8	205,2
SO250_46-1	31.08.2016 13:42:44	Net (generic)	NET	station end				f	45° 31,309' N	153° 2,935' E	7791,4	1,6	54	4,1	231,4
SO250_47-1	04.09.2016 06:50:03	Net (generic)	NET	station start			clean ship	f	45° 28,760' N	153° 11,650' E	0	1,1	27	2,9	144,9
SO250_47-1	04.09.2016 06:51:12	Net (generic)	NET	information			Gerät z/W, EL2	f	45° 28,747' N	153° 11,660' E	8741,1	0,6	24,2	2,1	102,4
SO250_47-1	04.09.2016 09:07:26	Net (generic)	NET	information			max depth, SLmax 5900m	f	45° 28,758' N	153° 11,649' E	8734	0,2	28,3	1,4	112,5
SO250_47-1	04.09.2016 12:39:57	Net (generic)	NET	information			Gerät a/D	f	45° 28,753' N	153° 11,654' E	0	0,2	345,9	1,8	325
SO250_47-1	04.09.2016 12:42:54	Net (generic)	NET	station end				f	45° 28,751' N	153° 11,650' E	8639,1	0,1	330,1	2,1	257,7
SO250_48-1	04.09.2016 12:53:19	Giant Box Corer	GKG	station start				f	45° 28,749' N	153° 11,650' E	8737,2	0,1	52,8	1,6	301,3
SO250_48-1	04.09.2016 12:54:41	Giant Box Corer	GKG	in the water			FW1/SPW1	f	45° 28,750' N	153° 11,649' E	8734,6	0,1	45,8	1,4	17,3

Station	Date / Time UTC	Device	Device Abbreviation	Action	Comment (Station)	Comment (Device Op)	Comment (Action)	Expedition Fixed	Latitude	Longitude	Depth (m)	Speed (kn)	Wind Dir	Wind speed (m/s)	Course
SO250_48-1	04.09.2016 15:23:31	Giant Box Corer	GKG	max depth/on ground			SLmax 8807m	f	45° 28,745' N	153° 11,651' E	8736,4	0,2	24,9	3,1	260,6
SO250_48-1	04.09.2016 15:24:17	Giant Box Corer	GKG	hoisting			SZmax 109,7kN	f	45° 28,745' N	153° 11,650' E	8734,2	0,1	31	1,5	329,7
SO250_48-1	04.09.2016 19:26:31	Giant Box Corer	GKG	on deck				f	45° 28,752' N	153° 11,652' E	8620,6	0,1	158	0,5	349,7
SO250_48-1	04.09.2016 19:43:36	Giant Box Corer	GKG	station end				f	45° 28,752' N	153° 11,652' E	8737,6	0,1	71,1	0,3	295,9
SO250_49-1	04.09.2016 19:51:15	Giant Box Corer	GKG	station start				f	45° 28,749' N	153° 11,652' E	8738,9	0,1	43,8	1,9	67,3
SO250_49-1	04.09.2016 20:45:30	Giant Box Corer	GKG	in the water			FW1/SPW1	f	45° 28,751' N	153° 11,656' E	8736,6	0	5,8	1,2	43
SO250_49-1	04.09.2016 22:54:41	Giant Box Corer	GKG	max depth/on ground			SLmax 8807m	f	45° 28,752' N	153° 11,649' E	8738,6	0,1	129,3	1,8	72,9
SO250_49-1	04.09.2016 22:55:03	Giant Box Corer	GKG	hoisting			SZmax 98,5kN	f	45° 28,753' N	153° 11,649' E	8740,5	0,1	134,1	1,9	80,9
SO250_49-1	05.09.2016 02:47:02	Giant Box Corer	GKG	on deck				f	45° 28,783' N	153° 11,538' E	8738,6	0,2	185,3	1,6	172,4
SO250_49-1	05.09.2016 02:52:25	Giant Box Corer	GKG	station end				f	45° 28,760' N	153° 11,602' E	8991,6	1,2	223,1	1,3	96,3
SO250_50-1	05.09.2016 03:21:15	Multi Corer	MUC	station start				f	45° 28,754' N	153° 11,659' E	8731,1	0,2	232,3	3,1	207,5
SO250_50-1	05.09.2016 03:22:45	Multi Corer	MUC	in the water			FW1 / SPW1	f	45° 28,755' N	153° 11,658' E	8733,3	0,4	212,8	3,4	39,4
SO250_50-1	05.09.2016 05:44:49	Multi Corer	MUC	max depth/on ground			SLmax 8799m	f	45° 28,748' N	153° 11,654' E	8737,1	0	245,6	4,1	94
SO250_50-1	05.09.2016 05:45:00	Multi Corer	MUC	hoisting			SZmax 91,3kN	f	45° 28,748' N	153° 11,653' E	8737,1	0,1	245	4,5	225,3
SO250_50-1	05.09.2016 08:50:00	Multi Corer	MUC	on deck				f	45° 28,747' N	153° 11,651' E	0	0,1	298,8	2,7	351,7
SO250_50-1	05.09.2016 08:52:00	Multi Corer	MUC	station end				f	45° 28,746' N	153° 11,651' E	8996,4	0,1	277,6	2,2	245,4
SO250_51-1	05.09.2016 09:12:02	Multi Corer	MUC	station start				f	45° 28,742' N	153° 11,652' E	8734,4	0,2	320,3	2	267,3
SO250_51-1	05.09.2016 09:15:22	Multi Corer	MUC	in the water			FW1/ SPW1	f	45° 28,741' N	153° 11,649' E	8736,4	0,1	294,9	3,4	121,8
SO250_51-1	05.09.2016 11:38:05	Multi Corer	MUC	max depth/on ground			SLmax 8799m	f	45° 28,751' N	153° 11,644' E	8734,9	0,2	318,3	1,7	228,5
SO250_51-1	05.09.2016 11:38:10	Multi Corer	MUC	hoisting			SZmax 94,7 kN	f	45° 28,751' N	153° 11,644' E	8734,9	0,1	311,5	1,8	125,8
SO250_51-1	05.09.2016 14:38:25	Multi Corer	MUC	on deck				f	45° 28,747' N	153° 11,650' E	8734,8	0,2	290,1	3,9	2,1
SO250_51-1	05.09.2016 14:40:01	Multi Corer	MUC	station end				f	45° 28,746' N	153° 11,650' E	8735,8	0,1	265,6	2,2	195,9
SO250_52-1	05.09.2016 15:36:16	EpiBenthic Sledge	EBS	station start				f	45° 32,000' N	153° 16,001' E	8358,1	0,4	302,8	5,3	196,6
SO250_52-1	05.09.2016 15:38:29	EpiBenthic Sledge	EBS	in the water			FW1 / SPW1	f	45° 31,996' N	153° 15,993' E	8358,4	0,7	304,6	4,9	240,2
SO250_52-1	05.09.2016 19:09:20	EpiBenthic Sledge	EBS	information			BoKo SL 9384m	f	45° 29,779' N	153° 12,160' E	8704,1	1	9	5,7	231
SO250_52-1	05.09.2016 19:09:26	EpiBenthic Sledge	EBS	information			Auslegen, rwK 231°, d 0,85nm	f	45° 29,778' N	153° 12,158' E	8704,1	1	8,8	5,6	244,2
SO250_52-1	05.09.2016 19:50:12	EpiBenthic Sledge	EBS	max depth/on ground			SLmax 11000m, Start Schleppe	f	45° 29,347' N	153° 11,415' E	8738,4	1,1	18	4,4	234,3
SO250_52-1	05.09.2016 20:05:14	EpiBenthic Sledge	EBS	hoisting				f	45° 29,190' N	153° 11,143' E	8701,2	0,4	26,3	3,6	259,2
SO250_52-1	05.09.2016 20:59:27	EpiBenthic Sledge	EBS	information			frei vom Grund, SL 9533m, SZmax 1	f	45° 29,187' N	153° 11,138' E	8698,7	0	359,5	0,8	159,6
SO250_52-1	06.09.2016 00:42:23	EpiBenthic Sledge	EBS	on deck				f	45° 29,188' N	153° 11,142' E	8645,9	0,1	56,6	3,4	25,9
SO250_52-1	06.09.2016 00:44:18	EpiBenthic Sledge	EBS	station end				f	45° 29,187' N	153° 11,143' E	8658,8	0,1	56,6	3,4	25,9
SO250_53-1	06.09.2016 01:09:45	Multi Corer	MUC	station start				f	45° 28,769' N	153° 11,616' E	9013,4	0,1	56,6	3,4	25,9
SO250_53-1	06.09.2016 01:11:06	Multi Corer	MUC	in the water			FW1/SPW1	f	45° 28,766' N	153° 11,612' E	8736,6	0,1	56,6	3,4	25,9
SO250_53-1	06.09.2016 03:35:47	Multi Corer	MUC	max depth/on ground			SLmax 8801m	f	45° 28,751' N	153° 11,648' E	8941,4	0,1	56,6	3,4	25,9
SO250_53-1	06.09.2016 03:36:05	Multi Corer	MUC	hoisting			SZmax 95,2kN	f	45° 28,751' N	153° 11,649' E	8941,4	0,1	56,6	3,4	25,9
SO250_53-1	06.09.2016 06:28:19	Multi Corer	MUC	on deck				f	45° 28,748' N	153° 11,644' E	8998,5	0,1	73,3	6,6	24,8
SO250_53-1	06.09.2016 06:29:03	Multi Corer	MUC	station end				f	45° 28,748' N	153° 11,644' E	9001,4	0,1	73,8	6,9	38,8
SO250_54-1	06.09.2016 07:18:40	Agassiz Trawl	AGT	station start				f	45° 31,123' N	153° 18,182' E	0	0,7	70,7	7,2	112,2
SO250_54-1	06.09.2016 07:28:28	Agassiz Trawl	AGT	in the water			FW1/SPW1,rwK 241°, d 9,45n	f	45° 31,110' N	153° 18,118' E	7884,8	0,7	70,7	5,1	238,2
SO250_54-1	06.09.2016 12:58:33	Agassiz Trawl	AGT	information			BoKo SL 9618 m	f	45° 28,502' N	153° 11,539' E	8728,9	1,1	102	10,5	241
SO250_54-1	06.09.2016 12:59:03	Agassiz Trawl	AGT	information			Auslegen, rwK 241°, d 0,8nm	f	45° 28,498' N	153° 11,529' E	8728,8	1	100,6	11	241,3
SO250_54-1	06.09.2016 13:42:51	Agassiz Trawl	AGT	max depth/on ground			SLmax 11000m, Start Schleppe	f	45° 28,139' N	153° 10,624' E	8700,8	1,1	87,1	11,4	236,7
SO250_54-1	06.09.2016 14:11:39	Agassiz Trawl	AGT	hoisting				f	45° 28,127' N	153° 10,104' E	10200,1	0,3	91,3	11,6	207,5
SO250_54-1	06.09.2016 15:17:16	Agassiz Trawl	AGT	information			frei vom Grund, SL 9290m, SZmax 1	f	45° 28,125' N	153° 10,109' E	8734,8	0,1	97,5	12,6	53,5
SO250_54-1	06.09.2016 18:42:53	Agassiz Trawl	AGT	on deck				f	45° 28,229' N	153° 9,738' E	8749,8	0,1	69,8	22	343,8
SO250_54-1	06.09.2016 18:45:35	Agassiz Trawl	AGT	station end				f	45° 28,228' N	153° 9,739' E	8745,5	0,3	70,4	21,3	21,1
SO250_55-1	06.09.2016 20:09:45	EpiBenthic Sledge	EBS	station start				f	45° 27,987' N	153° 17,967' E	8105,9	0,7	64,2	19,3	212,9
SO250_55-1	06.09.2016 20:14:02	EpiBenthic Sledge	EBS	in the water			FW1/SPW1	f	45° 28,003' N	153° 17,997' E	8055,6	0,9	72,5	14,2	344,1
SO250_55-1	06.09.2016 23:41:53	EpiBenthic Sledge	EBS	information			BoKo SL 9317m	f	45° 29,240' N	153° 13,460' E	8743,6	1,4	71	12,4	279,2

Station	Date / Time UTC	Device	Device Abbreviation	Action	Comment (Station)	Comment (Device Op)	Comment (Action)	Expedition Fixed	Latitude	Longitude	Depth (m)	Speed (kn)	Wind Dir	Wind speed (m/s)	Course
SO250_55-1	06.09.2016 23:42:14	EpiBenthic Sledge	EBS	information			Auslegen, rwK 290°, d 0,7nm	f	45° 29,242' N	153° 13,453' E	8734,4	1	78,8	15,1	280,6
SO250_55-1	07.09.2016 00:24:11	EpiBenthic Sledge	EBS	max depth/on ground			SLmax 11000m, Start Schleppe	f	45° 29,491' N	153° 12,540' E	8740,2	0,4	67,7	12,5	320
SO250_55-1	07.09.2016 00:39:19	EpiBenthic Sledge	EBS	hoisting				f	45° 29,575' N	153° 12,232' E	8737,2	0,3	66,1	12,5	242,6
SO250_55-1	07.09.2016 02:01:46	EpiBenthic Sledge	EBS	information			frei vom Grund, SL 9136m, SZmax 9	f	45° 29,580' N	153° 12,240' E	8735,4	0,2	64,7	14,1	105,9
SO250_55-1	07.09.2016 05:10:55	EpiBenthic Sledge	EBS	on deck				f	45° 29,483' N	153° 12,060' E	8735,8	0,5	69,1	17,9	100
SO250_55-1	07.09.2016 05:27:03	EpiBenthic Sledge	EBS	station end				f	45° 29,495' N	153° 12,064' E	8732,9	0,1	62,9	10,8	70,2
SO250_56-1	07.09.2016 06:17:17	Agassiz Trawl	AGT	station start				f	45° 28,005' N	153° 17,998' E	8096	0,4	74,5	11,6	167,2
SO250_56-1	07.09.2016 06:19:22	Agassiz Trawl	AGT	in the water			FW1 / SPW1, rwK 291°, d 8,33r	f	45° 28,008' N	153° 17,988' E	8121,1	0,8	68,8	9	210,6
SO250_56-1	07.09.2016 11:25:22	Agassiz Trawl	AGT	information			BoKo SL 9246 m	f	45° 29,630' N	153° 12,028' E	8725,9	1,4	48,3	10,5	295
SO250_56-1	07.09.2016 11:25:46	Agassiz Trawl	AGT	information			Auslegen, rwK 290°, d 1,0 nm	f	45° 29,633' N	153° 12,017' E	8719,9	1,6	48,7	10,5	294,1
SO250_56-1	07.09.2016 12:25:07	Agassiz Trawl	AGT	max depth/on ground			SLmax 11000m, Start Schleppe	f	45° 29,969' N	153° 10,781' E	8400,3	1,1	50	12,8	283,4
SO250_56-1	07.09.2016 12:47:32	Agassiz Trawl	AGT	hoisting				f	45° 30,082' N	153° 10,369' E	8399,5	0,6	41,3	9,9	280,3
SO250_56-1	07.09.2016 14:03:30	Agassiz Trawl	AGT	information			frei vom Grund, SL 9066m, SZmax 9	f	45° 30,086' N	153° 10,369' E	8403,8	0,3	58,7	12,1	355
SO250_56-1	07.09.2016 17:47:01	Agassiz Trawl	AGT	on deck				f	45° 30,079' N	153° 10,371' E	8400	0,3	19,2	13,2	359,1
SO250_56-1	07.09.2016 17:48:52	Agassiz Trawl	AGT	station end				f	45° 30,080' N	153° 10,371' E	8389,5	0,2	15,5	13,1	95,3
SO250_57-1	07.09.2016 18:27:26	KONGSBERG EM122	EM122	station start				f	45° 35,782' N	153° 13,384' E	8312,3	8	30,9	12,7	37,9
SO250_57-1	07.09.2016 18:27:37	KONGSBERG EM122	EM122	profile start			rwK 036°, FüG: 8,0kn	f	45° 35,800' N	153° 13,405' E	8306	8	28,1	13,7	39,3
SO250_57-1	07.09.2016 20:16:14	KONGSBERG EM122	EM122	alter course			rwK 280°, FüG 12kn	f	45° 47,299' N	153° 25,462' E	8305,6	7,9	52,9	14,1	18,8
SO250_57-1	07.09.2016 20:49:32	KONGSBERG EM122	EM122	alter course			rwK 217°, FüG 10kn	f	45° 48,643' N	153° 17,304' E	7480,8	11,5	53,6	14	278,4
SO250_57-1	07.09.2016 22:00:13	KONGSBERG EM122	EM122	alter course			rwK 297°, FüG 12kn	f	45° 39,488' N	153° 7,178' E	7813	10	33,5	13	262
SO250_57-1	07.09.2016 22:27:13	KONGSBERG EM122	EM122	alter course			rwK 039°, FüG 12kn	f	45° 41,914' N	153° 0,222' E	6846,2	11,9	46,1	13,9	296,8
SO250_57-1	07.09.2016 23:12:26	KONGSBERG EM122	EM122	alter course			rwK 284°, FüG 12 kn	f	45° 48,818' N	153° 7,390' E	6822,7	8,7	49,3	13,1	294,9
SO250_57-1	07.09.2016 23:23:40	KONGSBERG EM122	EM122	alter course			rwK 209°, FüG 12kn	f	45° 49,410' N	153° 4,152' E	6555,2	12,4	45,4	14,3	283,6
SO250_57-1	07.09.2016 23:46:06	KONGSBERG EM122	EM122	alter course			rwk 154°, FüG 12kn	f	45° 45,916' N	153° 0,997' E	6449	12,1	48,9	10,9	209,8
SO250_57-1	07.09.2016 23:46:36	KONGSBERG EM122	EM122	profile end				f	45° 45,828' N	153° 0,937' E	6650,5	11,4	44,2	11,7	199,7
SO250_58-1	08.09.2016 04:42:00	CTD	CTD	station start			clean ship	f	45° 11,001' N	153° 36,994' E	5965,4	0,6	34,7	11,7	80,5
SO250_58-1	08.09.2016 04:43:55	CTD	CTD	in the water			EL2	f	45° 11,002' N	153° 37,003' E	5964,6	0,4	27,9	13,4	226,9
SO250_58-1	08.09.2016 05:11:01	CTD	CTD	max depth/on ground			SLmax 1000m	f	45° 11,004' N	153° 37,003' E	5952,6	0,2	36,3	12	255,8
SO250_58-1	08.09.2016 05:12:14	CTD	CTD	hoisting				f	45° 11,004' N	153° 37,003' E	5950,9	0,4	37,1	13,5	6,2
SO250_58-1	08.09.2016 05:36:49	CTD	CTD	on deck				f	45° 11,003' N	153° 37,004' E	5961,7	0,6	30,8	14,5	51,7
SO250_58-1	08.09.2016 05:38:08	CTD	CTD	station end				f	45° 11,001' N	153° 37,008' E	5955,5	0,3	32,9	13,1	43,8
SO250_59-1	08.09.2016 05:40:00	KONGSBERG EM122	EM122	station start				f	45° 11,004' N	153° 37,007' E	5952,3	1	38,7	12,8	320
SO250_59-1	08.09.2016 05:41:17	KONGSBERG EM122	EM122	profile start			rwK 078°, FüG 6kn	f	45° 11,014' N	153° 37,017' E	5955,9	1,1	39,9	13	46,6
SO250_59-1	08.09.2016 06:15:41	KONGSBERG EM122	EM122	alter course			auf 161°rw	f	45° 11,708' N	153° 41,612' E	5944	6,7	25,5	13,6	75,7
SO250_59-1	08.09.2016 07:11:54	KONGSBERG EM122	EM122	alter course			rwK 262°, FüG 6kn	f	45° 6,793' N	153° 44,205' E	5601,2	5,5	31,9	12,9	155
SO250_59-1	08.09.2016 07:48:41	KONGSBERG EM122	EM122	profile end				f	45° 5,953' N	153° 39,180' E	5940,9	6,3	47,4	14,9	264,6
SO250_59-1	08.09.2016 07:48:44	KONGSBERG EM122	EM122	station end				f	45° 5,953' N	153° 39,172' E	5940,9	6,5	44,8	14,2	261,7
SO250_60-1	08.09.2016 08:37:33	Net (generic)	NET	station start			Clean Ship	f	45° 9,983' N	153° 45,371' E	5738,9	0,3	44,2	9,7	233,3
SO250_60-1	08.09.2016 08:47:21	Net (generic)	NET	information			Gerät z/W, EL2	f	45° 9,991' N	153° 45,383' E	5739,5	0,4	47	9,9	89,1
SO250_60-1	08.09.2016 10:58:14	Net (generic)	NET	information			max depth, SLmax 5600m	f	45° 9,996' N	153° 45,430' E	5752,1	0,2	37,9	10,1	230,2
SO250_60-1	08.09.2016 14:13:50	Net (generic)	NET	information			Gerät a/D	f	45° 9,999' N	153° 45,425' E	5742,9	0,2	56,3	10,1	27,6
SO250_60-1	08.09.2016 14:19:09	Net (generic)	NET	station end				f	45° 9,997' N	153° 45,425' E	5738,6	0,3	48,8	9,9	158,6
SO250_61-1	08.09.2016 14:30:31	Giant Box Corer	GKG	station start				f	45° 10,007' N	153° 45,417' E	5740,8	0,3	54,8	10,5	334,4
SO250_61-1	08.09.2016 14:36:36	Giant Box Corer	GKG	in the water			FW1/SPW1	f	45° 10,004' N	153° 45,421' E	5740,7	0,4	54,8	8,3	234
SO250_61-1	08.09.2016 16:08:11	Giant Box Corer	GKG	max depth/on ground			SLmax 5780m	f	45° 9,997' N	153° 45,419' E	5740,9	0,3	47,7	9,6	18,7
SO250_61-1	08.09.2016 16:09:31	Giant Box Corer	GKG	hoisting			SZmax 65,5kN	f	45° 9,997' N	153° 45,422' E	5741,5	0,1	45,2	8,8	298,4
SO250_61-1	08.09.2016 18:13:21	Giant Box Corer	GKG	on deck				f	45° 10,003' N	153° 45,419' E	5739,1	0,3	51,2	10,5	70
SO250_61-1	08.09.2016 18:15:11	Giant Box Corer	GKG	station end				f	45° 10,003' N	153° 45,419' E	5739,5	0,3	48,5	11,4	11,4
SO250_62-1	08.09.2016 18:37:29	Multi Corer	MUC	station start				f	45° 9,998' N	153° 45,418' E	5742,5	0,2	56,1	9,6	220,8

Station	Date / Time UTC	Device	Device Abbreviation	Action	Comment (Station)	Comment (Device Op)	Comment (Action)	Expedition Fixed	Latitude	Longitude	Depth (m)	Speed (kn)	Wind Dir	Wind speed (m/s)	Course
SO250_62-1	08.09.2016 18:39:03	Multi Corer	MUC	in the water			FW1 / SPW1	f	45° 9,995' N	153° 45,420' E	5742,7	0,3	46,8	10	249,8
SO250_62-1	08.09.2016 20:14:19	Multi Corer	MUC	max depth/on ground			SLmax 5782m	f	45° 10,002' N	153° 45,425' E	5741,2	0,3	78,3	8,3	287,2
SO250_62-1	08.09.2016 20:20:00	Multi Corer	MUC	hoisting			SZmax 67,7kN	f	45° 10,006' N	153° 45,419' E	5741,9	0,2	75,8	8,6	305,9
SO250_62-1	08.09.2016 22:09:07	Multi Corer	MUC	on deck				f	45° 9,999' N	153° 45,420' E	5741,7	0,6	81,5	10,4	167,7
SO250_62-1	08.09.2016 22:10:18	Multi Corer	MUC	station end				f	45° 10,000' N	153° 45,421' E	5741,9	0,3	69,2	10,5	25,2
SO250_63-1	08.09.2016 22:22:01	Multi Corer	MUC	station start				f	45° 10,000' N	153° 45,431' E	5743,4	1,1	91,6	10,8	263,6
SO250_63-1	08.09.2016 22:26:20	Multi Corer	MUC	in the water			FW1/SPW1	f	45° 9,999' N	153° 45,406' E	5742	1,3	85,3	9,4	265,9
SO250_63-1	09.09.2016 00:00:40	Multi Corer	MUC	max depth/on ground			SLmax 5787m	f	45° 10,007' N	153° 45,420' E	5739,4	0,2	62,8	10,1	101,3
SO250_63-1	09.09.2016 00:03:34	Multi Corer	MUC	hoisting			SZmax 68,8 kN	f	45° 10,007' N	153° 45,418' E	5740,4	0,1	66,8	8,5	259,8
SO250_63-1	09.09.2016 02:04:57	Multi Corer	MUC	on deck				f	45° 10,006' N	153° 45,417' E	5737,8	0,2	86,1	8,8	191
SO250_63-1	09.09.2016 02:09:26	Multi Corer	MUC	station end				f	45° 10,004' N	153° 45,423' E	5740	0,4	72,1	10,3	42,6
SO250_64-1	09.09.2016 02:55:31	Agassiz Trawl	AGT	station start				f	45° 7,863' N	153° 40,800' E	5743,1	0,9	65,8	10,4	76
SO250_64-1	09.09.2016 02:58:35	Agassiz Trawl	AGT	in the water			FW1/SPW1	f	45° 7,881' N	153° 40,863' E	5709,9	0,8	71,3	10,2	32,5
SO250_64-1	09.09.2016 06:27:00	Agassiz Trawl	AGT	information			BoKo SL 6320m	f	45° 9,388' N	153° 44,966' E	5738,6	1,1	86,7	11	93,3
SO250_64-1	09.09.2016 06:27:33	Agassiz Trawl	AGT	information			Auslegen, rwK 062°, 2,00nm	f	45° 9,393' N	153° 44,977' E	5733,7	1	94,4	8,6	82,8
SO250_64-1	09.09.2016 07:27:45	Agassiz Trawl	AGT	max depth/on ground			SLmax 8000m, Start Schleppe	f	45° 9,849' N	153° 46,235' E	5735,8	1,2	79,8	10,2	75,1
SO250_64-1	09.09.2016 07:47:18	Agassiz Trawl	AGT	hoisting				f	45° 9,991' N	153° 46,624' E	5727,4	0,2	82	9,3	52,9
SO250_64-1	09.09.2016 09:03:25	Agassiz Trawl	AGT	information			frei vom Grund, SL 6120m, SZmax 6	f	45° 9,991' N	153° 46,626' E	5726,1	0,5	97,6	13	112,4
SO250_64-1	09.09.2016 11:57:40	Agassiz Trawl	AGT	on deck				f	45° 9,996' N	153° 46,625' E	5726,8	0,5	96,7	10	111,7
SO250_64-1	09.09.2016 11:58:37	Agassiz Trawl	AGT	station end				f	45° 9,996' N	153° 46,624' E	5724,4	0,4	NaN	NaN	165,3
SO250_65-1	09.09.2016 12:56:04	EpiBenthic Sledge	EBS	station start				f	45° 8,994' N	153° 40,825' E	5677,8	1,2	94,9	8,2	81,2
SO250_65-1	09.09.2016 13:01:19	EpiBenthic Sledge	EBS	in the water			FW1/SPW1	f	45° 8,971' N	153° 40,895' E	5687,3	0,5	99,5	10,8	269
SO250_65-1	09.09.2016 15:36:08	EpiBenthic Sledge	EBS	information			BoKo SL 5997m	f	45° 9,859' N	153° 43,349' E	5755,5	0,8	113,2	15,8	28,9
SO250_65-1	09.09.2016 15:36:30	EpiBenthic Sledge	EBS	information			Auslegen, rwK 063°, d 2,30nm	f	45° 9,861' N	153° 43,353' E	5754,5	1	112,1	14,3	96,1
SO250_65-1	09.09.2016 17:05:01	EpiBenthic Sledge	EBS	max depth/on ground			SLmax 8000m, Start Schleppe	f	45° 10,226' N	153° 44,178' E	5733,9	1,8	107,5	15,4	84,5
SO250_65-1	09.09.2016 17:14:35	EpiBenthic Sledge	EBS	hoisting				f	45° 10,150' N	153° 44,022' E	5752,5	2,4	115,6	17,9	72,3
SO250_65-1	09.09.2016 18:33:29	EpiBenthic Sledge	EBS	information			frei vom Grund, SL 5887m, SZmax 7	f	45° 10,160' N	153° 44,052' E	5752,4	0,6	107,5	16,5	269,3
SO250_65-1	09.09.2016 20:49:04	EpiBenthic Sledge	EBS	on deck				f	45° 10,161' N	153° 44,048' E	5754,3	0,7	106,8	16,6	135,8
SO250_65-1	09.09.2016 21:04:27	EpiBenthic Sledge	EBS	station end				f	45° 10,151' N	153° 44,047' E	5752,3	0,3	110	19,7	94,8
SO250_66-1	10.09.2016 02:52:24	KONGSBERG EM122	EM122	station start				f	45° 3,405' N	152° 44,206' E	7397,2	8,7	139,4	8,1	239,8
SO250_66-1	10.09.2016 02:58:24	KONGSBERG EM122	EM122	profile start			rwK244°, FüG 9,0kn	f	45° 2,849' N	152° 43,236' E	7069,4	9,6	168,8	8,7	237,5
SO250_66-1	10.09.2016 03:11:17	KONGSBERG EM122	EM122	station end				f	45° 1,955' N	152° 40,756' E	7911,5	9,3	160,2	7,3	246,3
SO250_67-1	10.09.2016 06:10:11	Giant Box Corer	GKG	station start				f	45° 12,943' N	152° 42,847' E	9492,2	0,4	196,3	6,8	327,7
SO250_67-1	10.09.2016 06:12:01	Giant Box Corer	GKG	in the water			FW1 / SPW1	f	45° 12,943' N	152° 42,844' E	9989,5	0,5	192	8,5	359,2
SO250_67-1	10.09.2016 08:42:44	Giant Box Corer	GKG	max depth/on ground			SLmax 9557m	f	45° 12,944' N	152° 42,844' E	9494,6	0,2	195,2	10,4	355
SO250_67-1	10.09.2016 08:42:48	Giant Box Corer	GKG	hoisting			SZmax 107,0 kN	f	45° 12,944' N	152° 42,844' E	9494,6	0,4	194,8	10,6	268,5
SO250_67-1	10.09.2016 12:40:42	Giant Box Corer	GKG	on deck				f	45° 12,948' N	152° 42,841' E	9496,8	1,5	216,6	10,3	48
SO250_67-1	10.09.2016 12:46:57	Giant Box Corer	GKG	station end				f	45° 12,943' N	152° 42,838' E	9487,1	0,4	232,1	11	161
SO250_68-1	10.09.2016 12:58:41	Multi Corer	MUC	station start				f	45° 12,937' N	152° 42,838' E	9495,1	0,7	224,2	11,5	183,3
SO250_68-1	10.09.2016 13:12:24	Multi Corer	MUC	in the water			FW1/SPW1	f	45° 12,942' N	152° 42,835' E	9493,9	0,9	216,8	8,7	240,7
SO250_68-1	10.09.2016 15:56:57	Multi Corer	MUC	max depth/on ground			SLmax 9563m	f	45° 12,941' N	152° 42,840' E	9494,6	1,5	238,8	9,3	228,6
SO250_68-1	10.09.2016 15:57:08	Multi Corer	MUC	hoisting			SZmax 104,9kN	f	45° 12,941' N	152° 42,840' E	9493,9	1,3	229,8	10,3	221,7
SO250_68-1	10.09.2016 19:33:48	Multi Corer	MUC	on deck				f	45° 12,948' N	152° 42,835' E	9493,2	0,8	240,8	8,9	118,6
SO250_68-1	10.09.2016 19:37:01	Multi Corer	MUC	station end				f	45° 12,947' N	152° 42,832' E	9495,2	0,4	244,4	8,1	314,9
SO250_69-1	10.09.2016 19:41:01	Multi Corer	MUC	station start				f	45° 12,948' N	152° 42,838' E	9492,8	0,1	252,5	9,4	223,3
SO250_69-1	10.09.2016 19:42:00	Multi Corer	MUC	in the water			FW1 / SPW1	f	45° 12,948' N	152° 42,838' E	9494,5	0,2	246,7	8,6	170,3
SO250_69-1	10.09.2016 22:18:57	Multi Corer	MUC	max depth/on ground			SLmax 9567m	f	45° 12,943' N	152° 42,837' E	9493,1	0,1	263,5	13,3	343,7
SO250_69-1	10.09.2016 22:19:22	Multi Corer	MUC	hoisting			SZmax 99,8kN	f	45° 12,943' N	152° 42,838' E	9477,2	0,2	266,7	11	353,7
SO250_69-1	11.09.2016 02:45:53	Multi Corer	MUC	on deck				f	45° 12,946' N	152° 42,833' E	9496,3	0,3	252,4	10,2	149,4

Station	Date / Time UTC	Device	Device Abbreviation	Action	Comment (Station)	Comment (Device Op)	Comment (Action)	Expedition Fixed	Latitude	Longitude	Depth (m)	Speed (kn)	Wind Dir	Wind speed (m/s)	Course
SO250_69-1	11.09.2016 02:47:44	Multi Corer	MUC	station end				f	45° 12,946' N	152° 42,831' E	9464	0,6	255	13,8	328,5
SO250_70-1	11.09.2016 04:15:20	EpiBenthic Sledge	EBS	station start				f	45° 13,501' N	152° 49,988' E	9544,5	0,6	263,1	14,2	302,6
SO250_70-1	11.09.2016 04:16:30	EpiBenthic Sledge	EBS	in the water			FW1 / SPW1	f	45° 13,497' N	152° 49,971' E	9544	1,5	261,8	14,2	272,1
SO250_70-1	11.09.2016 04:44:00	EpiBenthic Sledge	EBS	information			Abbruch Station, hieven an Dec	f	45° 13,402' N	152° 49,561' E	9470,1	0,3	267,7	14,7	306,2
SO250_70-1	11.09.2016 05:00:23	EpiBenthic Sledge	EBS	on deck				f	45° 13,405' N	152° 49,569' E	9475	0,5	265,1	15,8	147,3
SO250_70-1	11.09.2016 05:05:39	EpiBenthic Sledge	EBS	station end				f	45° 13,403' N	152° 49,570' E	9457	0,1	253,6	16,3	328
SO250_71-1	11.09.2016 08:29:00	KONGSBERG EM122	EM122	station start				f	44° 57,503' N	152° 30,944' E	8033,6	4,7	287,5	21,8	213
SO250_71-1	11.09.2016 08:29:06	KONGSBERG EM122	EM122	profile start			rwK 245°, FüG 5kn	f	44° 57,497' N	152° 30,938' E	8033,6	4,6	284,9	17,4	208,2
SO250_71-1	11.09.2016 20:40:32	KONGSBERG EM122	EM122	profile end				f	44° 31,251' N	151° 11,961' E	8506	5,4	335,7	16,7	244,9
SO250_71-1	11.09.2016 20:40:37	KONGSBERG EM122	EM122	station end				f	44° 31,247' N	151° 11,952' E	8506	4,8	336,7	17,2	261,1
SO250_72-1	11.09.2016 20:56:00	CTD	CTD	station start			clean ship	f	44° 31,504' N	151° 11,593' E	8430,5	0,3	316,5	11	93,5
SO250_72-1	11.09.2016 21:00:00	CTD	CTD	in the water			EL 2	f	44° 31,499' N	151° 11,602' E	8377	0,1	327,9	12,6	76,4
SO250_72-1	11.09.2016 21:28:07	CTD	CTD	max depth/on ground			SLmax1000 m	f	44° 31,506' N	151° 11,605' E	8392	0,4	318,4	11,4	110,6
SO250_72-1	11.09.2016 21:52:52	CTD	CTD	on deck				f	44° 31,499' N	151° 11,600' E	8405,6	0,1	330,1	11,5	219,4
SO250_72-1	11.09.2016 21:56:13	CTD	CTD	station end				f	44° 31,468' N	151° 11,636' E	8418,3	0,7	334	11,8	134,7
SO250_73-1	11.09.2016 23:30:30	Net (generic)	NET	station start			Clean ship	f	44° 39,885' N	151° 28,106' E	8222,7	0,2	343,4	11,6	40,9
SO250_73-1	11.09.2016 23:34:26	Net (generic)	NET	information			Gerät z/W, EL2	f	44° 39,884' N	151° 28,106' E	8218,5	0,1	350,5	12,7	287,6
SO250_73-1	11.09.2016 23:57:20	Net (generic)	NET	information			max detph, SLmax 1000m	f	44° 39,888' N	151° 28,106' E	8221,7	0,7	331,6	12,4	288,3
SO250_73-1	12.09.2016 00:34:56	Net (generic)	NET	information			Gerät a/D	f	44° 39,888' N	151° 28,111' E	8226,9	0,7	331,8	12,2	74,7
SO250_73-1	12.09.2016 00:36:00	Net (generic)	NET	station end				f	44° 39,887' N	151° 28,115' E	8219,9	0,2	346	11,2	13,7
SO250_74-1	12.09.2016 00:41:37	Multi Corer	MUC	station start				f	44° 39,890' N	151° 28,112' E	8225,9	0,1	322,1	10,7	96,1
SO250_74-1	12.09.2016 00:46:06	Multi Corer	MUC	in the water			FW1/SPW1	f	44° 39,889' N	151° 28,113' E	8224,9	0,2	328,7	12	306,2
SO250_74-1	12.09.2016 03:10:47	Multi Corer	MUC	max depth/on ground			SLmax 8291m	f	44° 39,883' N	151° 28,106' E	8221,1	0,4	322,1	10,7	290,9
SO250_74-1	12.09.2016 03:12:15	Multi Corer	MUC	hoisting			SZmax 90,1kN	f	44° 39,887' N	151° 28,105' E	8220,8	0,6	322,4	9,5	285,8
SO250_74-1	12.09.2016 06:13:44	Multi Corer	MUC	on deck				f	44° 39,882' N	151° 28,101' E	8219,7	0,3	314,7	10,7	212,1
SO250_74-1	12.09.2016 06:16:00	Multi Corer	MUC	station end				f	44° 39,883' N	151° 28,101' E	8220,6	0,2	321,6	9,1	5,8
SO250_75-1	12.09.2016 06:34:05	Giant Box Corer	GKG	station start				f	44° 39,889' N	151° 28,108' E	8220,5	0,2	300,4	10,4	28,9
SO250_75-1	12.09.2016 06:35:36	Giant Box Corer	GKG	in the water			FW1 / SPW1	f	44° 39,890' N	151° 28,110' E	8231,9	0,2	310,7	10,6	280,5
SO250_75-1	12.09.2016 08:42:38	Giant Box Corer	GKG	max depth/on ground			SLmax 8287m	f	44° 39,883' N	151° 28,136' E	8220,9	0,2	306,3	10,8	122,1
SO250_75-1	12.09.2016 08:44:46	Giant Box Corer	GKG	hoisting			SZmax 106,2kN	f	44° 39,883' N	151° 28,137' E	8220,1	0,3	299,3	13,6	260,5
SO250_75-1	12.09.2016 12:18:19	Giant Box Corer	GKG	on deck				f	44° 39,886' N	151° 28,140' E	8237,6	0,2	293,5	11,8	28,6
SO250_75-1	12.09.2016 12:20:56	Giant Box Corer	GKG	station end				f	44° 39,884' N	151° 28,145' E	8222,9	0,6	297	9,6	85,7
SO250_76-1	12.09.2016 18:02:34	Multi Corer	MUC	station start				f	45° 12,940' N	152° 42,833' E	7956,1	1	311,8	11,3	131,1
SO250_76-1	12.09.2016 18:04:06	Multi Corer	MUC	in the water			FW1 / SPW1	f	45° 12,946' N	152° 42,823' E	9492,4	0,8	308,1	10,2	320,8
SO250_76-1	12.09.2016 20:40:23	Multi Corer	MUC	max depth/on ground			SLmax 9571m	f	45° 12,939' N	152° 42,836' E	9498,9	0,3	307,3	8,8	147,6
SO250_76-1	12.09.2016 20:44:41	Multi Corer	MUC	hoisting			SZmax 99,2N	f	45° 12,944' N	152° 42,830' E	9463,7	0,7	322,2	9,6	262,7
SO250_76-1	13.09.2016 00:32:17	Multi Corer	MUC	on deck				f	45° 12,946' N	152° 42,831' E	9473,9	0,6	324,6	6,5	66
SO250_76-1	13.09.2016 00:33:03	Multi Corer	MUC	station end				f	45° 12,945' N	152° 42,830' E	9475	0,7	320,6	7,4	235,9
SO250_77-1	13.09.2016 01:38:14	EpiBenthic Sledge	EBS	station start				f	45° 12,011' N	152° 55,491' E	8858	0,2	315,3	9	157,4
SO250_77-1	13.09.2016 01:39:34	EpiBenthic Sledge	EBS	in the water			FW1/SPW1	f	45° 12,012' N	152° 55,490' E	8839,2	0,4	309,9	8,7	265,5
SO250_77-1	13.09.2016 05:20:38	EpiBenthic Sledge	EBS	information			BoKo SL 10046m	f	45° 13,719' N	152° 51,219' E	9427,8	1,3	331,8	6,6	299,1
SO250_77-1	13.09.2016 05:21:35	EpiBenthic Sledge	EBS	information			Auslegen, rwK 300°, d 0,70nm	f	45° 13,726' N	152° 51,198' E	9413,5	0,7	347,5	6,5	327,8
SO250_77-1	13.09.2016 05:43:19	EpiBenthic Sledge	EBS	max depth/on ground			SLmax 11000m, Start Schleppe	f	45° 13,892' N	152° 50,774' E	9576,9	1	351,1	6,1	347,6
SO250_77-1	13.09.2016 07:26:02	EpiBenthic Sledge	EBS	hoisting				f	45° 14,218' N	152° 49,962' E	9582,7	0,2	322,1	6,5	303,8
SO250_77-1	13.09.2016 08:00:19	EpiBenthic Sledge	EBS	information			frei vom Grund, SL 10073m, SZmax 1	f	45° 14,219' N	152° 49,956' E	9582,8	0	338	5,2	213,7
SO250_77-1	13.09.2016 11:42:30	EpiBenthic Sledge	EBS	on deck				f	45° 14,250' N	152° 49,907' E	9581,2	0,9	303,9	3,2	9,4
SO250_77-1	13.09.2016 11:45:02	EpiBenthic Sledge	EBS	station end				f	45° 14,256' N	152° 49,903' E	9583,1	0,6	288,9	3,7	221
SO250_78-1	13.09.2016 12:36:06	Agassiz Trawl	AGT	station start				f	45° 11,202' N	152° 56,770' E	8411	5	301,9	4,7	226,4
SO250_78-1	13.09.2016 12:46:19	Agassiz Trawl	AGT	in the water			FW1/SPW1	f	45° 11,068' N	152° 56,238' E	8453,2	0,9	294,7	3,6	328,3

Station	Date / Time UTC	Device	Device Abbreviation	Action	Comment (Station)	Comment (Device Op)	Comment (Action)	Expedition Fixed	Latitude	Longitude	Depth (m)	Speed (kn)	Wind Dir	Wind speed (m/s)	Course
SO250_78-1	13.09.2016 18:53:27	Agassiz Trawl	AGT	information			BoKo SL 10400m	f	45° 13,979' N	152° 48,980' E	9581,7	1,3	281,9	2,3	335,4
SO250_78-1	13.09.2016 18:53:54	Agassiz Trawl	AGT	information			Auslegen, rwK 300°, d 0,33nm	f	45° 13,983' N	152° 48,971' E	9580,4	1	262,2	2,7	300,9
SO250_78-1	13.09.2016 19:15:08	Agassiz Trawl	AGT	max depth/on ground			SLmax 11000m, Start Schleppe	f	45° 14,150' N	152° 48,555' E	9583,3	0,4	235,2	3,6	319,6
SO250_78-1	13.09.2016 20:36:42	Agassiz Trawl	AGT	hoisting				f	45° 14,480' N	152° 47,734' E	9582	0,8	225,9	4,6	294,9
SO250_78-1	13.09.2016 21:00:38	Agassiz Trawl	AGT	information			frei vom Grund, SL 10345m, SZmax 1	f	45° 14,482' N	152° 47,736' E	9581,3	0,3	234,6	4,4	66,7
SO250_78-1	14.09.2016 01:50:19	Agassiz Trawl	AGT	on deck				f	45° 14,561' N	152° 47,557' E	9580,1	1,2	225,3	5,2	305,9
SO250_78-1	14.09.2016 01:51:17	Agassiz Trawl	AGT	station end				f	45° 14,573' N	152° 47,541' E	9582,2	1,2	228,8	5,4	307,1
SO250_79-1	14.09.2016 02:24:01	Giant Box Corer	GKG	station start				f	45° 12,985' N	152° 42,757' E	9427,8	0,2	234,2	5,4	230,6
SO250_79-1	14.09.2016 02:25:49	Giant Box Corer	GKG	in the water			FW1/SPW1	f	45° 12,983' N	152° 42,760' E	9197,3	0,7	241	5,8	7,4
SO250_79-1	14.09.2016 04:41:03	Giant Box Corer	GKG	max depth/on ground			SLmax 9565m	f	45° 12,943' N	152° 42,821' E	9448,9	0,6	227,5	5,4	241,5
SO250_79-1	14.09.2016 04:42:26	Giant Box Corer	GKG	hoisting			SZmax 103,2kN	f	45° 12,943' N	152° 42,821' E	9462,9	0,2	229,4	5,6	207,5
SO250_79-1	14.09.2016 08:57:21	Giant Box Corer	GKG	on deck				f	45° 12,941' N	152° 42,825' E	9492,7	0,1	221,4	3,7	77,9
SO250_79-1	14.09.2016 09:08:49	Giant Box Corer	GKG	station end				f	45° 12,946' N	152° 42,830' E	9494,6	0,2	220	2,7	57,8
SO250_80-1	14.09.2016 11:06:04	KONGSBERG EM122	EM122	station start				f	45° 37,057' N	152° 45,850' E	6473,6	12,3	209,2	3,3	245
SO250_80-1	14.09.2016 11:06:09	KONGSBERG EM122	EM122	profile start			rwk 245°, FüG 13 kn	f	45° 37,049' N	152° 45,828' E	6489	12,9	206,6	3,7	243,8
SO250_80-1	14.09.2016 17:29:25	KONGSBERG EM122	EM122	profile end				f	44° 59,652' N	150° 53,091' E	4744,9	13,9	110,7	3,3	245,1
SO250_80-1	14.09.2016 17:29:43	KONGSBERG EM122	EM122	station end				f	44° 59,623' N	150° 53,002' E	4746,4	13,8	115,5	2,9	244,7
SO250_81-1	14.09.2016 18:21:23	Net (generic)	NET	station start			clean ship	f	45° 1,357' N	151° 2,853' E	5179,6	0,7	133,1	4,7	65,5
SO250_81-1	14.09.2016 18:25:11	Net (generic)	NET	information			Gerät z/W, EL 2	f	45° 1,361' N	151° 2,895' E	5216,1	0,8	131,3	4,5	22,4
SO250_81-1	14.09.2016 18:49:01	Net (generic)	NET	information			max.dept, SLmax 1000m	f	45° 1,364' N	151° 2,908' E	5222,7	0,2	124,8	4,7	332,2
SO250_81-1	14.09.2016 19:29:07	Net (generic)	NET	information			Gerät a/D	f	45° 1,357' N	151° 2,902' E	5214,1	0,4	119,5	4,7	40,7
SO250_81-1	14.09.2016 19:30:34	Net (generic)	NET	station end				f	45° 1,358' N	151° 2,902' E	5216,2	0,1	115,4	5	44,4
SO250_82-1	14.09.2016 19:42:02	Giant Box Corer	GKG	station start				f	45° 1,355' N	151° 2,899' E	5220,1	0,1	116,9	5,1	24,6
SO250_82-1	14.09.2016 19:47:11	Giant Box Corer	GKG	in the water			FW1 / SPW1	f	45° 1,355' N	151° 2,901' E	5216,4	0,4	112,4	4,6	230
SO250_82-1	14.09.2016 21:12:26	Giant Box Corer	GKG	max depth/on ground			SLmax 5259m	f	45° 1,363' N	151° 2,899' E	5220,1	0,1	92,9	4	287,7
SO250_82-1	14.09.2016 21:14:49	Giant Box Corer	GKG	hoisting			SZmax 58,6kn	f	45° 1,361' N	151° 2,899' E	5478	0,1	102,3	3,6	204,7
SO250_82-1	14.09.2016 23:33:43	Giant Box Corer	GKG	on deck				f	45° 1,360' N	151° 2,901' E	5219	0,1	58	2,8	146,6
SO250_82-1	14.09.2016 23:33:48	Giant Box Corer	GKG	station end				f	45° 1,360' N	151° 2,901' E	5559,4	0,7	55,5	2,9	238,1
SO250_83-1	14.09.2016 23:50:52	Multi Corer	MUC	station start				f	45° 1,362' N	151° 2,897' E	5211,5	0,3	110,6	2,7	1,2
SO250_83-1	14.09.2016 23:53:37	Multi Corer	MUC	in the water			FW1/SPW1	f	45° 1,367' N	151° 2,899' E	5209,5	0,1	94,3	3,1	143,3
SO250_83-1	15.09.2016 01:23:12	Multi Corer	MUC	max depth/on ground			SLmax 5257m	f	45° 1,356' N	151° 2,901' E	5211,3	0,2	10,6	1,4	17,1
SO250_83-1	15.09.2016 01:38:05	Multi Corer	MUC	hoisting			SZmax 66,3 kN	f	45° 1,357' N	151° 2,897' E	5212,4	0,1	114,2	0,9	39
SO250_83-1	15.09.2016 03:41:20	Multi Corer	MUC	on deck				f	45° 1,360' N	151° 2,897' E	5219,6	0,3	16,4	0,7	186,7
SO250_83-1	15.09.2016 03:42:52	Multi Corer	MUC	station end				f	45° 1,361' N	151° 2,896' E	5217,9	0,3	2,3	0,1	48,9
SO250_84-1	15.09.2016 04:00:00	Multi Corer	MUC	station start				f	45° 1,360' N	151° 2,895' E	5214,4	0,4	NaN	NaN	251,4
SO250_84-1	15.09.2016 04:01:05	Multi Corer	MUC	in the water			FW1 / SPW1	f	45° 1,359' N	151° 2,894' E	5215,7	0,6	NaN	NaN	236,2
SO250_84-1	15.09.2016 04:07:09	Multi Corer	MUC	information			bei SL 100m Transponder am Dr	f	45° 1,358' N	151° 2,893' E	5214,1	0,8	126,8	0,7	54,8
SO250_84-1	15.09.2016 05:24:18	Multi Corer	MUC	max depth/on ground			SLmax 5255m	f	45° 1,360' N	151° 2,891' E	5217,4	0,1	322,4	1,2	308,6
SO250_84-1	15.09.2016 05:39:17	Multi Corer	MUC	hoisting			SZmax 67,6kN	f	45° 1,360' N	151° 2,892' E	5213,6	0,2	341,2	1,2	85,4
SO250_84-1	15.09.2016 07:41:20	Multi Corer	MUC	information			Transponder a/D	f	45° 1,357' N	151° 2,903' E	5215,2	0,1	315	3,1	182,5
SO250_84-1	15.09.2016 07:46:02	Multi Corer	MUC	on deck				f	45° 1,359' N	151° 2,901' E	5211,7	0,2	313,5	2,7	125,2
SO250_84-1	15.09.2016 07:54:02	Multi Corer	MUC	station end				f	45° 1,360' N	151° 2,899' E	5211,3	0,5	317,4	2,6	78,4
SO250_85-1	15.09.2016 08:33:42	EpiBenthic Sledge	EBS	station start				f	45° 3,080' N	150° 59,524' E	4520,7	5	317,1	3,3	15,6
SO250_85-1	15.09.2016 08:44:15	EpiBenthic Sledge	EBS	in the water			FW1/SPW1	f	45° 3,160' N	150° 59,905' E	4510,6	1,6	323	1,7	102,4
SO250_85-1	15.09.2016 10:40:12	EpiBenthic Sledge	EBS	information			BoKo SL 4860m	f	45° 2,265' N	151° 2,143' E	4903,4	1	79,8	0,6	125,3
SO250_85-1	15.09.2016 10:40:13	EpiBenthic Sledge	EBS	information			Auslegen, rwK 120°, d 1,2nm	f	45° 2,265' N	151° 2,144' E	4903,4	0,8	63,1	1,1	106,3
SO250_85-1	15.09.2016 11:43:45	EpiBenthic Sledge	EBS	max depth/on ground			SLmax 7505m, Start schlepper	f	45° 1,729' N	151° 3,483' E	5228,6	1,4	200,3	1,4	135,9
SO250_85-1	15.09.2016 11:54:53	EpiBenthic Sledge	EBS	hoisting				f	45° 1,648' N	151° 3,681' E	5260,9	0,4	222,2	2,6	185
SO250_85-1	15.09.2016 13:08:03	EpiBenthic Sledge	EBS	information			frei vom Grund, SL 5550m, SZmax 6	f	45° 1,649' N	151° 3,686' E	5265,6	0,6	239,1	2,2	34,7

Station	Date / Time UTC	Device	Device Abbreviation	Action	Comment (Station)	Comment (Device Op)	Comment (Action)	Expedition Fixed	Latitude	Longitude	Depth (m)	Speed (kn)	Wind Dir	Wind speed (m/s)	Course
SO250_85-1	15.09.2016 15:28:01	EpiBenthic Sledge	EBS	on deck				f	45° 1,643' N	151° 3,676' E	5256,4	0,1	357,3	8,5	35,8
SO250_85-1	15.09.2016 15:41:53	EpiBenthic Sledge	EBS	station end				f	45° 1,643' N	151° 3,676' E	5256,4	0,1	7,7	9,7	263,2
SO250_86-1	15.09.2016 16:35:22	Agassiz Trawl	AGT	station start				f	44° 56,737' N	151° 6,012' E	5678,7	1,3	13,4	11,4	344,5
SO250_86-1	15.09.2016 16:37:54	Agassiz Trawl	AGT	in the water			FW1 / SPW1, rwK 000°, d 7,00r	f	44° 56,784' N	151° 6,009' E	5630,5	1,2	6,2	9,7	355,2
SO250_86-1	15.09.2016 20:09:06	Agassiz Trawl	AGT	information			BoKo SL 6130m	f	45° 0,435' N	151° 6,010' E	5493,4	1,1	349,8	7,2	334,6
SO250_86-1	15.09.2016 20:09:24	Agassiz Trawl	AGT	information			Auslegen, rwK 000°, d 0,76nm	f	45° 0,440' N	151° 6,010' E	5483,9	1,1	350,4	6,6	327,9
SO250_86-1	15.09.2016 20:55:14	Agassiz Trawl	AGT	max depth/on ground			SLmax 7500m, Start Schleppe	f	45° 1,202' N	151° 6,008' E	5571,6	1,2	355,5	8,1	20,3
SO250_86-1	15.09.2016 21:06:08	Agassiz Trawl	AGT	hoisting				f	45° 1,372' N	151° 6,010' E	5525,3	0,2	2,3	6,8	56,8
SO250_86-1	15.09.2016 22:21:08	Agassiz Trawl	AGT	information			frei vom Grund, SL 5500m, SZmax 7	f	45° 1,371' N	151° 6,001' E	5529,5	0,5	10,5	5,6	89,4
SO250_86-1	16.09.2016 01:34:25	Agassiz Trawl	AGT	on deck				f	45° 1,374' N	151° 5,986' E	5541,4	0,4	332,3	4,5	325,5
SO250_86-1	16.09.2016 01:37:11	Agassiz Trawl	AGT	station end				f	45° 1,464' N	151° 6,023' E	5534,6	4,6	348	5,6	42,5
SO250_87-1	16.09.2016 02:13:42	EpiBenthic Sledge	EBS	station start				f	44° 58,024' N	151° 5,589' E	5640,8	0,7	336	6,9	346,1
SO250_87-1	16.09.2016 02:18:27	EpiBenthic Sledge	EBS	information			FW1/SPW1	f	44° 58,102' N	151° 5,580' E	5640,5	1	331,2	6,9	18
SO250_87-1	16.09.2016 04:49:18	EpiBenthic Sledge	EBS	information			BoKo SL 5931m	f	45° 0,767' N	151° 5,537' E	5475,9	1,4	15,2	5,6	6,9
SO250_87-1	16.09.2016 04:50:32	EpiBenthic Sledge	EBS	information			Auslegen, rwK 000°, d 2,80nm	f	45° 0,786' N	151° 5,536' E	5475,4	0,6	16	4,2	325,6
SO250_87-1	16.09.2016 05:23:34	EpiBenthic Sledge	EBS	max depth/on ground			SLmax 7500m, Start Schleppe	f	45° 1,383' N	151° 5,527' E	5495,7	1,1	21,2	5,9	340,5
SO250_87-1	16.09.2016 05:39:05	EpiBenthic Sledge	EBS	hoisting				f	45° 1,648' N	151° 5,524' E	5363,9	0,2	21,9	5,5	353,8
SO250_87-1	16.09.2016 06:48:01	EpiBenthic Sledge	EBS	information			frei vom Grund, SL 5788m, SZmax 7	f	45° 1,651' N	151° 5,522' E	5477,8	0,4	63,3	6,5	98,7
SO250_87-1	16.09.2016 08:58:44	EpiBenthic Sledge	EBS	on deck				f	45° 1,640' N	151° 5,527' E	5479,5	0	55,8	4,5	196,9
SO250_87-1	16.09.2016 09:32:48	EpiBenthic Sledge	EBS	station end				f	45° 1,608' N	151° 5,450' E	5465,4	0,1	68,2	5,2	353,2
SO250_88-1	16.09.2016 11:50:55	Multi Corer	MUC	station start				f	44° 39,902' N	151° 28,108' E	8215,8	0,2	150,7	5,2	196,9
SO250_88-1	16.09.2016 11:52:12	Multi Corer	MUC	in the water			FW1/SPW1	f	44° 39,902' N	151° 28,107' E	8215,6	0,1	138,1	4,4	26,9
SO250_88-1	16.09.2016 14:10:33	Multi Corer	MUC	max depth/on ground			SLmax 8285m	f	44° 39,862' N	151° 28,103' E	8224	0,3	141	8,1	154,9
SO250_88-1	16.09.2016 14:16:54	Multi Corer	MUC	hoisting			SZmax 87,5 kN	f	44° 39,865' N	151° 28,101' E	8223,1	0,5	152,3	7,9	62,8
SO250_88-1	16.09.2016 17:07:50	Multi Corer	MUC	on deck				f	44° 39,865' N	151° 28,098' E	8235,5	0,2	168,2	10,5	311,4
SO250_88-1	16.09.2016 17:09:37	Multi Corer	MUC	station end				f	44° 39,865' N	151° 28,097' E	8234,9	0,1	158,1	12,1	90,7
SO250_89-1	16.09.2016 18:12:03	EpiBenthic Sledge	EBS	station start				f	44° 44,047' N	151° 27,420' E	7668,8	1,6	185,2	12,8	183,4
SO250_89-1	16.09.2016 18:14:40	EpiBenthic Sledge	EBS	in the water			FW1 / SPW1	f	44° 44,008' N	151° 27,418' E	7629,1	0,9	178	10,9	223,3
SO250_89-1	16.09.2016 21:52:29	EpiBenthic Sledge	EBS	information			BoKo SL 9048m	f	44° 40,124' N	151° 27,350' E	8227,4	1	187,7	10,6	169,7
SO250_89-1	16.09.2016 21:52:30	EpiBenthic Sledge	EBS	information			Auslegen rwK 180°, d 0,78nm	f	44° 40,124' N	151° 27,350' E	8227,4	1,1	183,9	12	172,6
SO250_89-1	16.09.2016 22:36:19	EpiBenthic Sledge	EBS	max depth/on ground			SLmax 11000m, Start Schleppe	f	44° 39,325' N	151° 27,340' E	8215	1,2	207	10,8	202,1
SO250_89-1	16.09.2016 22:51:14	EpiBenthic Sledge	EBS	hoisting				f	44° 39,057' N	151° 27,338' E	8212,2	0,1	195,6	10,1	284
SO250_89-1	17.09.2016 00:43:14	EpiBenthic Sledge	EBS	information			frei vom Grund, SL 8520m, SZmax 9	f	44° 39,053' N	151° 27,343' E	8216,5	0,5	207,3	13,1	245
SO250_89-1	17.09.2016 04:01:08	EpiBenthic Sledge	EBS	on deck				f	44° 39,060' N	151° 27,335' E	8203,6	0,2	277,5	9,6	203,4
SO250_89-1	17.09.2016 04:16:20	EpiBenthic Sledge	EBS	station end				f	44° 39,053' N	151° 27,338' E	8194,4	0,2	271	12,3	304,3
SO250_90-1	17.09.2016 04:59:05	Agassiz Trawl	AGT	station start				f	44° 36,297' N	151° 31,910' E	9248	0,7	303,7	11,4	326,7
SO250_90-1	17.09.2016 05:01:37	Agassiz Trawl	AGT	in the water			FW1 / SPW1, rwK 325°, d 8,30r	f	44° 36,336' N	151° 31,882' E	9244,2	0,8	314,1	13,6	317,4
SO250_90-1	17.09.2016 10:28:21	Agassiz Trawl	AGT	information			BoKo SL 9258m	f	44° 40,950' N	151° 27,347' E	8254,6	1,3	355,1	14,6	335,3
SO250_90-1	17.09.2016 10:28:29	Agassiz Trawl	AGT	information			Auslegen, rwK 325°, d 1,0 nm	f	44° 40,953' N	151° 27,345' E	8252,8	0,8	2,9	15,2	348,8
SO250_90-1	17.09.2016 11:29:03	Agassiz Trawl	AGT	max depth/on ground			SLmax 11000 m, Start Schleppe	f	44° 41,759' N	151° 26,554' E	8271,1	1,2	346,9	11,4	346,8
SO250_90-1	17.09.2016 11:44:30	Agassiz Trawl	AGT	hoisting				f	44° 41,987' N	151° 26,325' E	8281,9	1,1	8,4	13,4	250,4
SO250_90-1	17.09.2016 13:10:57	Agassiz Trawl	AGT	information			frei vom Grund, SL 8756m, Szmax 1	f	44° 41,992' N	151° 26,321' E	8272,9	0,5	11	11,3	76
SO250_90-1	17.09.2016 17:55:34	Agassiz Trawl	AGT	on deck				f	44° 41,993' N	151° 26,326' E	8275,2	0,4	314,8	9,4	36,8
SO250_90-1	17.09.2016 17:57:41	Agassiz Trawl	AGT	station end				f	44° 41,993' N	151° 26,326' E	8276,1	0,8	330,5	8	235,1
SO250_91-1	17.09.2016 21:00:00	CTD	CTD	station start			clean ship	f	44° 7,599' N	151° 26,589' E	6544,9	0,8	353,3	7	146,7
SO250_91-1	17.09.2016 21:01:07	CTD	CTD	in the water			EL 2	f	44° 7,609' N	151° 26,587' E	6533,5	1,6	359,9	7,3	10,8
SO250_91-1	17.09.2016 21:29:21	CTD	CTD	max depth/on ground			SLmax 1000m	f	44° 7,620' N	151° 26,583' E	6547	0,2	359,6	7,4	43,5
SO250_91-1	17.09.2016 21:30:16	CTD	CTD	hoisting				f	44° 7,620' N	151° 26,584' E	6543,4	0	354	6,5	253,4
SO250_91-1	17.09.2016 21:53:01	CTD	CTD	on deck				f	44° 7,626' N	151° 26,578' E	6540,2	0,8	35,7	6,5	245,2

Station	Date / Time UTC	Device	Device Abbreviation	Action	Comment (Station)	Comment (Device Op)	Comment (Action)	Expedition Fixed	Latitude	Longitude	Depth (m)	Speed (kn)	Wind Dir	Wind speed (m/s)	Course
SO250_91-1	17.09.2016 21:54:38	CTD	CTD	station end				f	44° 7,621' N	151° 26,585' E	6540,3	0,4	40	7,3	104,9
SO250_92-1	17.09.2016 22:13:03	KONGSBERG EM122	EM122	station start				f	44° 10,234' N	151° 27,327' E	6615,4	6,4	355	3	21
SO250_92-1	17.09.2016 22:16:48	KONGSBERG EM122	EM122	profile start			rwK 136°, FüG 6kn	f	44° 10,319' N	151° 27,790' E	6628	7	35,2	3,3	128,7
SO250_92-1	17.09.2016 22:43:22	KONGSBERG EM122	EM122	alter course			auf 231°rw	f	44° 8,409' N	151° 30,340' E	6457,9	5,9	2	3,6	133,2
SO250_92-1	17.09.2016 23:36:13	KONGSBERG EM122	EM122	alter course			auf 319° rw	f	44° 5,095' N	151° 25,056' E	6687,6	6,1	13,9	3,6	233,5
SO250_92-1	18.09.2016 00:05:00	KONGSBERG EM122	EM122	profile end				f	44° 7,002' N	151° 22,490' E	6594,8	6,2	9,2	4,6	327,2
SO250_92-1	18.09.2016 00:06:06	KONGSBERG EM122	EM122	station end				f	44° 7,094' N	151° 22,444' E	6598,3	5,9	341,9	3,8	18,6
SO250_93-1	18.09.2016 00:16:26	Net (generic)	NET	station start			clean ship	f	44° 6,566' N	151° 24,233' E	6571,1	8,8	359,3	5,1	96,1
SO250_93-1	18.09.2016 00:33:21	Net (generic)	NET	information			Gerät z/W EL2	f	44° 6,786' N	151° 25,550' E	6510,5	0,3	11,3	6,1	40,9
SO250_93-1	18.09.2016 01:07:33	Net (generic)	NET	information			max depth, Slmax 1500m	f	44° 6,848' N	151° 25,542' E	6521,9	0,1	346,3	3,1	185
SO250_93-1	18.09.2016 02:03:36	Net (generic)	NET	information			Gerät a/D	f	44° 6,851' N	151° 25,541' E	6527,9	0,1	340,4	4,4	215,7
SO250_93-1	18.09.2016 02:03:43	Net (generic)	NET	station end				f	44° 6,851' N	151° 25,541' E	6527,9	0,5	343,8	3,6	99,7
SO250_94-1	18.09.2016 02:04:14	Giant Box Corer	GKG	station start				f	44° 6,851' N	151° 25,541' E	6525,8	0,3	353,6	4,8	47,7
SO250_94-1	18.09.2016 02:16:29	Giant Box Corer	GKG	in the water			FW1/SPW1	f	44° 6,850' N	151° 25,536' E	6524,3	0,2	325,2	3,1	307,6
SO250_94-1	18.09.2016 03:54:30	Giant Box Corer	GKG	max depth/on ground			SLmax 6568m	f	44° 6,852' N	151° 25,539' E	6530,9	0,2	332,6	2,6	146,1
SO250_94-1	18.09.2016 03:56:53	Giant Box Corer	GKG	hoisting			SZmax 87,0kN	f	44° 6,854' N	151° 25,539' E	6527,6	0,5	352,7	3,5	327,2
SO250_94-1	18.09.2016 06:25:43	Giant Box Corer	GKG	on deck				f	44° 6,848' N	151° 25,543' E	6520,9	0,3	28,3	1,8	9,4
SO250_94-1	18.09.2016 06:34:04	Giant Box Corer	GKG	station end				f	44° 6,850' N	151° 25,547' E	6526,2	0,3	276,1	0,8	4,5
SO250_95-1	18.09.2016 06:35:55	Multi Corer	MUC	station start				f	44° 6,852' N	151° 25,546' E	6522,4	0,8	251,4	1,4	222,2
SO250_95-1	18.09.2016 06:37:41	Multi Corer	MUC	in the water			FW1 / SPW1	f	44° 6,851' N	151° 25,547' E	6525,6	0,2	263,7	1,1	64,5
SO250_95-1	18.09.2016 08:32:38	Multi Corer	MUC	max depth/on ground			SLmax 6569m	f	44° 6,850' N	151° 25,560' E	6517,5	0,1	70,6	3,2	110,4
SO250_95-1	18.09.2016 08:39:18	Multi Corer	MUC	hoisting			SZmax 73,5 kN	f	44° 6,854' N	151° 25,556' E	6520,7	0,3	75,4	1,8	258,3
SO250_95-1	18.09.2016 11:50:15	Multi Corer	MUC	on deck				f	44° 6,850' N	151° 25,550' E	6513,4	0,3	151,7	1,9	13,2
SO250_95-1	18.09.2016 11:50:25	Multi Corer	MUC	station end				f	44° 6,850' N	151° 25,550' E	6513,4	0,4	151,4	3,4	194,5
SO250_96-1	18.09.2016 12:01:34	Multi Corer	MUC	station start				f	44° 6,847' N	151° 25,552' E	6515,2	0,3	102,2	4,4	342,9
SO250_96-1	18.09.2016 12:03:48	Multi Corer	MUC	in the water			FW1/SPW1	f	44° 6,849' N	151° 25,545' E	6515,3	0,3	98,6	5,3	258,9
SO250_96-1	18.09.2016 14:02:32	Multi Corer	MUC	max depth/on ground			SLmax 6572m	f	44° 6,851' N	151° 25,543' E	6515,8	0,1	135	4,8	278,2
SO250_96-1	18.09.2016 14:12:11	Multi Corer	MUC	hoisting			SZmax 68,4 kN	f	44° 6,850' N	151° 25,550' E	6525,9	0,2	114,2	6,4	209,1
SO250_96-1	18.09.2016 17:08:04	Multi Corer	MUC	on deck				f	44° 6,849' N	151° 25,543' E	6515,2	0,4	117,6	6,5	280,4
SO250_96-1	18.09.2016 17:22:47	Multi Corer	MUC	station end				f	44° 6,848' N	151° 25,542' E	6515,2	0,5	111,3	6,7	299,7
SO250_97-1	18.09.2016 18:04:12	EpiBenthic Sledge	EBS	station start				f	44° 2,747' N	151° 24,880' E	6280,1	0,9	110,4	4,5	354,7
SO250_97-1	18.09.2016 18:07:05	EpiBenthic Sledge	EBS	in the water			FW1 / SPW1	f	44° 2,799' N	151° 24,878' E	6294,6	0,8	126,8	4,7	15,9
SO250_97-1	18.09.2016 20:53:54	EpiBenthic Sledge	EBS	information			BoKo SL 6945m	f	44° 5,680' N	151° 24,880' E	6440,4	1,2	105,5	7,8	22,6
SO250_97-1	18.09.2016 20:53:58	EpiBenthic Sledge	EBS	information			Auslegen, rwK 000°, d 0,98nm	f	44° 5,681' N	151° 24,880' E	6440,4	1,2	109,2	8,3	10,1
SO250_97-1	18.09.2016 21:52:44	EpiBenthic Sledge	EBS	max depth/on ground			SLmax 9500m, Start Schleppe	f	44° 6,668' N	151° 24,878' E	6551,3	1,1	89,7	7,8	345,8
SO250_97-1	18.09.2016 22:09:12	EpiBenthic Sledge	EBS	hoisting				f	44° 6,942' N	151° 24,876' E	6579,5	0,5	87,3	7,9	93,1
SO250_97-1	19.09.2016 00:07:44	EpiBenthic Sledge	EBS	information			frei vom Grund, SL 6676 m, SZmax	f	44° 6,942' N	151° 24,888' E	6560,7	0,5	76,6	6,4	153,1
SO250_97-1	19.09.2016 02:40:07	EpiBenthic Sledge	EBS	on deck				f	44° 7,043' N	151° 24,871' E	6577	0,4	87,6	7,1	316,6
SO250_97-1	19.09.2016 02:41:01	EpiBenthic Sledge	EBS	station end				f	44° 7,055' N	151° 24,867' E	6575,7	0,8	94,5	6,1	336,1
SO250_98-1	19.09.2016 03:49:02	Agassiz Trawl	AGT	station start				f	44° 3,538' N	151° 19,425' E	6522,1	1,1	99,4	7	53,8
SO250_98-1	19.09.2016 03:58:23	Agassiz Trawl	AGT	in the water			FW1 / SPW1, rwK 060°, d 8,30r	f	44° 3,531' N	151° 19,524' E	6513,9	0,9	84,7	6,6	30,1
SO250_98-1	19.09.2016 07:42:13	Agassiz Trawl	AGT	information			BoKo SL 6958m	f	44° 5,538' N	151° 24,258' E	6445,6	0,8	68,6	7,1	68,7
SO250_98-1	19.09.2016 07:42:26	Agassiz Trawl	AGT	information			Auslegen, rwK 060°, d 1,23nm	f	44° 5,540' N	151° 24,262' E	6445,1	1	66,4	7,3	51,2
SO250_98-1	19.09.2016 08:54:49	Agassiz Trawl	AGT	max depth/on ground			SLmax 9000m, Start Schlpper	f	44° 6,152' N	151° 25,705' E	6441	1,5	85,8	7,2	27,4
SO250_98-1	19.09.2016 09:06:45	Agassiz Trawl	AGT	hoisting				f	44° 6,248' N	151° 25,934' E	6443	0,4	84,7	6,5	166,5
SO250_98-1	19.09.2016 10:42:04	Agassiz Trawl	AGT	information			frei vom Grund, SL 6720m, SZmax 7	f	44° 6,253' N	151° 25,935' E	6442,1	0,1	105,4	7,2	82,1
SO250_98-1	19.09.2016 13:51:54	Agassiz Trawl	AGT	on deck				f	44° 6,286' N	151° 25,905' E	6445,6	1	102,3	7,5	345,3
SO250_98-1	19.09.2016 13:52:58	Agassiz Trawl	AGT	station end				f	44° 6,312' N	151° 25,903' E	6446,7	2,2	104,9	8,3	358,3
SO250_99-1	19.09.2016 15:55:49	KONGSBERG EM122	EM122	station start			rwK 244°, FüG 12kn	f	44° 31,225' N	151° 12,631' E	8536,6	11,9	86,1	7,9	313,7

Station	Date / Time UTC	Device	Device Abbreviation	Action	Comment (Station)	Comment (Device Op)	Comment (Action)	Expedition Fixed	Latitude	Longitude	Depth (m)	Speed (kn)	Wind Dir	Wind speed (m/s)	Course
SO250_99-1	19.09.2016 20:07:04	KONGSBERG EM122	EM122	alter course			auf 161° rw, FüG 8kn	f	44° 9,819' N	150° 9,944' E	8056,9	11,6	64	6	204,5
SO250_99-1	19.09.2016 20:47:05	KONGSBERG EM122	EM122	alter course			auf 154°rw	f	44° 4,609' N	150° 12,161' E	9289,1	8,1	67,7	6,5	161,6
SO250_99-1	19.09.2016 21:17:21	KONGSBERG EM122	EM122	alter course			auf 070°rw	f	44° 0,942' N	150° 14,587' E	9214,1	8	55,4	6,8	154,2
SO250_99-1	19.09.2016 22:11:17	KONGSBERG EM122	EM122	alter course			auf 359°rw, FüG 12kn	f	44° 2,895' N	150° 23,834' E	8844,6	8	48,8	6,1	67,3
SO250_99-1	19.09.2016 23:22:08	KONGSBERG EM122	EM122	profile end				f	44° 16,278' N	150° 24,028' E	8103	12	64,2	4,9	358,9
SO250_99-1	19.09.2016 23:22:25	KONGSBERG EM122	EM122	station end				f	44° 16,334' N	150° 24,028' E	8103	11,9	59,5	5,7	0,8
SO250_100-1	20.09.2016 01:33:30	Giant Box Corer	GKG	station start				f	44° 12,313' N	150° 39,080' E	9411,6	0,6	23,3	3,4	294
SO250_100-1	20.09.2016 01:36:21	Giant Box Corer	GKG	in the water			FW1/SPW1	f	44° 12,317' N	150° 39,066' E	9308,4	0,2	22,3	4,2	329,4
SO250_100-1	20.09.2016 03:58:51	Giant Box Corer	GKG	max depth/on ground			SLmax 9384m	f	44° 12,378' N	150° 39,053' E	9304,9	0,2	6,7	3,6	118,9
SO250_100-1	20.09.2016 03:59:42	Giant Box Corer	GKG	hoisting			SZmax 98,3kN	f	44° 12,379' N	150° 39,053' E	9307,2	0,3	6,2	2,2	312,2
SO250_100-1	20.09.2016 07:37:16	Giant Box Corer	GKG	on deck				f	44° 12,382' N	150° 39,048' E	9309,8	0,4	269	2,8	46,3
SO250_100-1	20.09.2016 07:47:00	Giant Box Corer	GKG	station end				f	44° 12,385' N	150° 39,056' E	9312,1	0,4	250,5	2,4	71,3
SO250_101-1	20.09.2016 08:16:00	Multi Corer	MUC	station start				f	44° 12,405' N	150° 36,028' E	9539,8	0,6	259,5	2,8	147
SO250_101-1	20.09.2016 08:17:10	Multi Corer	MUC	in the water			FW1 / SPW1	f	44° 12,400' N	150° 36,032' E	9539,5	0	268,1	2,5	245
SO250_101-1	20.09.2016 10:56:36	Multi Corer	MUC	max depth/on ground			SLmax 9619m	f	44° 12,391' N	150° 36,015' E	9538,6	0,1	290,6	5,1	195,4
SO250_101-1	20.09.2016 11:11:26	Multi Corer	MUC	hoisting			SZmax 103,1 kN	f	44° 12,389' N	150° 36,014' E	9539	0,3	297,3	5,6	262,9
SO250_101-1	20.09.2016 15:17:15	Multi Corer	MUC	on deck				f	44° 12,385' N	150° 36,014' E	9540,4	0,7	317	4,6	150
SO250_101-1	20.09.2016 15:26:00	Multi Corer	MUC	station end				f	44° 12,384' N	150° 36,012' E	9539,3	0,3	304	3,9	155,1
SO250_102-1	20.09.2016 16:00:06	EpiBenthic Sledge	EBS	station start				f	44° 11,986' N	150° 40,067' E	9011	1,9	315	4,6	253,6
SO250_102-1	20.09.2016 16:03:28	EpiBenthic Sledge	EBS	in the water			FW1 / SPW1	f	44° 11,971' N	150° 39,961' E	9021,7	1,1	318,7	5	225,3
SO250_102-1	20.09.2016 19:59:09	EpiBenthic Sledge	EBS	information			BoKo SL 10500m	f	44° 11,996' N	150° 34,077' E	9547,2	1,1	281,2	3,3	273
SO250_102-1	20.09.2016 20:00:00	EpiBenthic Sledge	EBS	information			Auslegen, rwK 270°, d 0,22m	f	44° 11,996' N	150° 34,055' E	9545,2	1,1	273,1	3,3	273,2
SO250_102-1	20.09.2016 20:11:21	EpiBenthic Sledge	EBS	max depth/on ground			SLmax 11000m, Start Schleppe	f	44° 11,997' N	150° 33,766' E	9537,3	1,4	278,3	3,4	260,9
SO250_102-1	20.09.2016 21:32:39	EpiBenthic Sledge	EBS	hoisting				f	44° 11,998' N	150° 32,740' E	9472,1	0,4	276	3,3	264,9
SO250_102-1	20.09.2016 21:57:17	EpiBenthic Sledge	EBS	information			frei vom Grund, SL 10300m, SZmax	f	44° 12,003' N	150° 32,745' E	9473,9	0,3	270,6	4,3	45,2
SO250_102-1	21.09.2016 02:08:30	EpiBenthic Sledge	EBS	on deck				f	44° 12,016' N	150° 32,781' E	9468,3	0,4	282,3	3,4	51,4
SO250_102-1	21.09.2016 02:17:18	EpiBenthic Sledge	EBS	station end				f	44° 11,818' N	150° 33,141' E	9524,3	5,6	278,6	6,4	142,3
SO250_103-1	21.09.2016 03:08:04	Agassiz Trawl	AGT	station start				f	44° 12,510' N	150° 29,424' E	8894,7	0,8	341,4	2,5	84,8
SO250_103-1	21.09.2016 03:10:45	Agassiz Trawl	AGT	in the water			FW1 / SPW1, rwK 090°, d 7,56n	f	44° 12,506' N	150° 29,468' E	8894,5	1,4	333,8	1,4	102,6
SO250_103-1	21.09.2016 09:31:32	Agassiz Trawl	AGT	information			BoKo SL 10940m	f	44° 12,499' N	150° 39,035' E	9292,9	0,4	28,5	7,1	122,3
SO250_103-1	21.09.2016 09:31:38	Agassiz Trawl	AGT	information			Auslegen, rwK 090°, d 0,1nm	f	44° 12,499' N	150° 39,036' E	9292,9	0,5	28,6	6,8	95,9
SO250_103-1	21.09.2016 09:34:45	Agassiz Trawl	AGT	max depth/on ground			SLmax 11000m,Start Schleppe	f	44° 12,499' N	150° 39,055' E	9301,1	0,6	31,3	6	79
SO250_103-1	21.09.2016 10:40:52	Agassiz Trawl	AGT	hoisting				f	44° 12,500' N	150° 39,272' E	9311,2	0,3	14,8	7,4	233,6
SO250_103-1	21.09.2016 11:31:00	Agassiz Trawl	AGT	information			Net stucked; Moving back on rou	f	44° 12,499' N	150° 38,967' E	9294,8	0,3	18	7,3	293,2
SO250_103-1	21.09.2016 13:40:05	Agassiz Trawl	AGT	information			Off bottom: SL: 9400 m	f	44° 12,502' N	150° 37,258' E	9430,8	0,2	30,5	6,2	46
SO250_103-1	21.09.2016 18:27:22	Agassiz Trawl	AGT	on deck				f	44° 12,393' N	150° 36,013' E	9539,9	0,1	24,7	3,9	191
SO250_103-1	21.09.2016 18:29:44	Agassiz Trawl	AGT	station end				f	44° 12,393' N	150° 36,012' E	9541	0,2	19	4,3	336,2
SO250_104-1	21.09.2016 18:35:19	Multi Corer	MUC	station start				f	44° 12,395' N	150° 36,013' E	9540,9	0,1	14,5	4,2	354,6
SO250_104-1	21.09.2016 18:37:20	Multi Corer	MUC	in the water			FW1 / SPW1	f	44° 12,394' N	150° 36,014' E	9540,8	0,2	16,8	4,5	215,4
SO250_104-1	21.09.2016 21:25:40	Multi Corer	MUC	max depth/on ground			SLmax 9619m	f	44° 12,388' N	150° 36,013' E	9540,2	0,3	350,5	0,5	284,9
SO250_104-1	21.09.2016 21:40:12	Multi Corer	MUC	hoisting			SZmax 102,5kN	f	44° 12,393' N	150° 36,009' E	9539,5	0,2	79,1	0,3	245,3
SO250_104-1	22.09.2016 02:10:05	Multi Corer	MUC	on deck				f	44° 12,386' N	150° 36,013' E	9537,9	0,2	181,3	2	227,9
SO250_104-1	22.09.2016 02:11:21	Multi Corer	MUC	station end				f	44° 12,387' N	150° 36,014' E	9539,3	0,1	177,4	1,3	63,2
SO250_105-1	22.09.2016 02:24:13	Giant Box Corer	GKG	station start				f	44° 12,389' N	150° 36,014' E	9538,5	0,1	139	1,3	241,1
SO250_105-1	22.09.2016 02:31:02	Giant Box Corer	GKG	in the water			FW1/SPW1	f	44° 12,387' N	150° 36,011' E	9537,7	0,1	135,3	1,4	262,7
SO250_105-1	22.09.2016 04:46:10	Giant Box Corer	GKG	max depth/on ground			SLmax 9614m	f	44° 12,391' N	150° 36,006' E	9539,6	0,1	181,8	3	77
SO250_105-1	22.09.2016 04:47:02	Giant Box Corer	GKG	hoisting			SZmax 115,1kN	f	44° 12,390' N	150° 36,006' E	9539	0,1	193,9	5,3	173,8
SO250_105-1	22.09.2016 08:55:55	Giant Box Corer	GKG	on deck				f	44° 12,387' N	150° 36,007' E	9542,1	0,1	NaN	NaN	29,3
SO250_105-1	22.09.2016 09:00:00	Giant Box Corer	GKG	station end				f	44° 12,386' N	150° 36,010' E	9539,3	0,5	193,7	5	73,8

Station	Date / Time UTC	Device	Device Abbreviation	Action	Comment (Station)	Comment (Device Op)	Comment (Action)	Expedition Fixed	Latitude	Longitude	Depth (m)	Speed (kn)	Wind Dir	Wind speed (m/s)	Course
SO250_106-1	22.09.2016 09:11:56	Net (generic)	NET	station start				f	44° 12,525' N	150° 36,301' E	9538,9	1,1	177,3	4	54,1
SO250_106-1	22.09.2016 09:16:38	Net (generic)	NET	information			Gerät z/W, EL 2	f	44° 12,531' N	150° 36,308' E	9539	0,3	198,8	4,9	21,9
SO250_106-1	22.09.2016 11:27:18	Net (generic)	NET	information			max. depth, SL max 5900m	f	44° 12,529' N	150° 36,307' E	9541,2	0,2	216,3	6,6	200,5
SO250_106-1	22.09.2016 14:45:34	Net (generic)	NET	information			Gerät a/D	f	44° 12,524' N	150° 36,310' E	9537,7	0,2	177,8	6,9	104
SO250_106-1	22.09.2016 14:48:56	Net (generic)	NET	station end				f	44° 12,525' N	150° 36,308' E	9538,9	0	185,2	6,4	58,9