SO-250 KuramBio II
5. Weekly Report
(12.09. – 18.09.2016)

FS. SONNE
44°39.05´N / 151°27.34´E

World record with full nets

Last Sunday we had to weather a storm and made use of the time for bathymetric scanning of the seafloor. On Monday we first started sampling in working area A9, that we passed by during mapping. Also, the sea was more favourable at this locality with lower wave hights than at A7, which was originally planned to be the next site. At A9, we spent one day mapping the sea floor and deploying CTD, plankton net, box corer as well as multiple corer. But then we couldn‘t wait any longer. We returned to the deepest of our proposed working areas (A7) at 9581 m depth, where the hadal seafloor

Figure1: The epibenthic sledge (EBS) „META“ (left) and the Agassiz Trawl (AGT, right) are heaved onto the working deck of RV Sonne after the record-breaking deployments. The fine-meshed nets of the EBS and the wider AGT net held sediment and organisms from 9581 m depth. This was the deepest deployment ever conducted with an EBS. (c) Angelika Brandt

lies deeper below the surface than the altitude of the Himalaya. Sampling in such depth reqires lots of patience from both scientists and crew because each deployment takes a lot of time. Each trawl with the epibenthic sledge, for instance, or the Agassiz Trawl took more than twelve hours. During the first box-corer deployment the rope tension at bottom contact was inconclusive. It appeared as if the closing mechanism had not been triggered. In this case, the gear would have come back to the ship empty. However, the opposite was the case. After more than seven hours deployment the sediment surface was still undisturbed when the box was pulled out from the corer, the water crystal clear. It was a fascinating moment! Deep-sea floor from more than 9500 m depth! Although it had been our plan to conduct these deployments all the time: it was hard to believe that this relatively small device just had successfully collected the sea floor at almost 10 km beneath RV Sonne and put it right in front of us.

Figure 2: The proud EBS team after the successful deployment in 9581 m depth during the KuramBio II expedition on board RV Sonne. (C) Oliver Meyer

The immediate sieving and fixation of the samples revealed numerous bivalves and pogonophorans - chemosynthetically feeding relatives of the polychaetes. 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). The head of EBS operations, Nils Brenke, had to make use of the full length of available cable, 11,000 m, that is available on the winch of RV Sonne. 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. 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 it is not available. It was hence not clear if the EBS would reach the ground. Despite its weight, currents may cause drifting and the bottom may not be reached. It 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 (Fig. 2). Echiurids and elpidiid holothurians (sea cucumbers), amphipods, bivalves (clams, mussels) and many other taxa were comprising this sample.

Figure 3: Hard structures are rare in the sediment plains of the hadal and abyssal. Accordingly, sessile organisms make use also of „artificial" hard substrates, such as these tubes built by polychaetes. In this case they are inhabited by other polychaetes, cnidarian polypes, and have been used for egg deposition. (c) A.V. Lavrenteva

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 – more than 1100 holothurians for example (Fig. 4). Like at all sampling sites before we also encountered a high diversity and richness at this deepest station. This also includes organisms that make use of calcium carbonate for skellettal 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 star-ted collecting more samples in the early morning of September 17. First we deployed the plankton net. After the

Figure 4: The small sea cucumber or „sea pig“ *Elpidia* cf. *hanseni* was caught in large numbers by the trawl in 9581 m depth. (c) A. V. Lavrenteva

deployments of a box corer and two multiple corers the EBS presented a totally different sediment as compared to the closeby 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 eroding the smaller sediment particles. Nevertheless we already got a glimpse at the many small critters that the sample contained during washing and sieving it. It was clearly shown that the hadal organisms of many taxa are really larger at abyssal depths than here in the abyss (gigantism, we briefly mentioned that in an earlier report).

Finally the AGT apparently got entangled at the seafloor, possibly amongst large boulders. The head of operations, Kirill Minin, got quite nervous while awaiting his gear back on board. The AGT net indeet arrived in a desastrous state of destruction, however, the net still contained the sample. It was comprised of manifold megafauna organisms with many different species of sea cucumbers, as well as several big stones.

After finishing all stations at A10 we returned to A9, where we had already started sampling on Monday during bad weather. We completed our set of deployments with each one 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 capable decisions as to where to deploy the benthos gear. However, about those stations we are going to report next week.

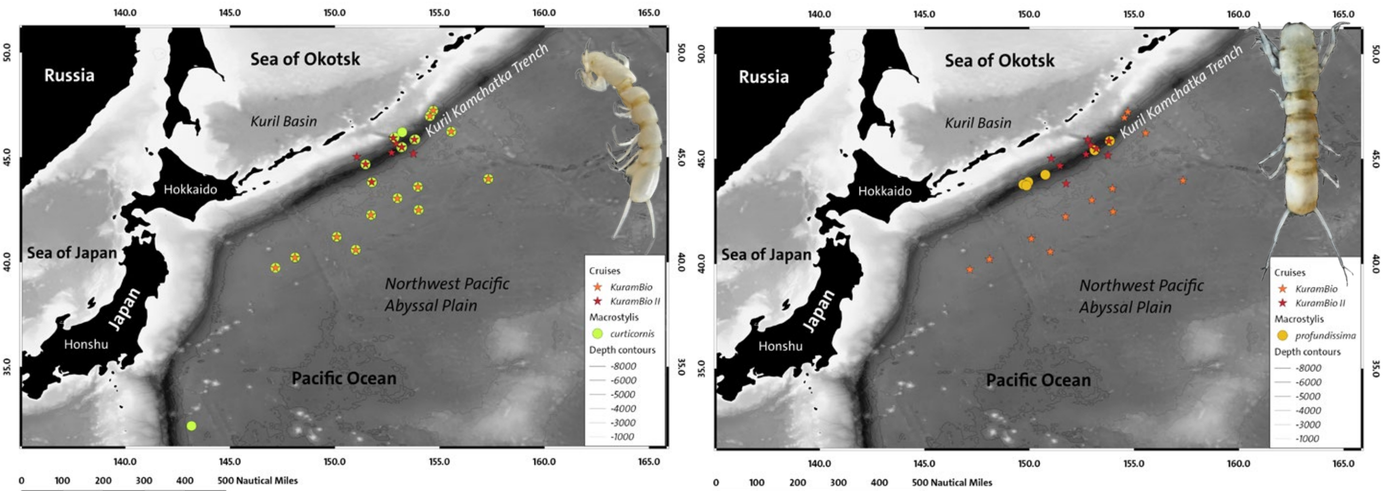

Figure 5. Distribution of the isopod species *Macrostylis curticornis* Birstein, 1963 and *M. profundissima* Birstein, 1970 (Macrostylidae) after preliminary sorting and taxonomic identification. Both species are currently only known from the North-west Pacific and show morphological similarities. The distribution patterns are however different: While *M. curticornis* (3-10 mm) occurs on both sidesof the KKT in abyssal as well as hadal depths the much smaller *M. profundissima* (1-3 mm) seems to be restricted to depths deeper than 7000 m. In the home laboratories molecular genetic analyses will help to test if there is differentiation across the trench and whether or not we are dealing with one or several cryptic species. (c) Torben Riehl, CeNak

Already now, after our on-board sorting and taxonomic identification, interesting distribution patterns become appa-rent. We found species for which the Kuril Kamchatka Trench seems to be no barrier. They were found on both sides as well as in both hadal and abyssal depths. Other species occur only within the trench; again others were collected only on one side. This was the case, for instance, in different species of the isopod family Macrostylidae of which selected preliminary results have been documented by Torben Riehl using distribution maps (Fig. 5).

Everybody is well on board! Best wishes for you and our families!

Angelika Brandt, Center of Natural History (CeNak), (expedition leader SO250) on behalf of all participants