5th Cruise report (May 23 to 30, 2016)

SO-248 „BacGeoPac“ 01.05.2016 (Auckland, New Zealand) – 03.06.2016 (Dutch Harbor, Alaska, USA)

In the evening of May 27th we left the Pacific proper and steamed through the chain of the Aleutian Islands into the Bering Sea. We were lucky and able to see with binoculars in a distance of 40 nautical miles at a fair visibility three of the snow covered islands. Before, we had visited between May 23rd and 27th stations 13 to 16 at 40°, 45°, 47,5° and at 50°N again a 40-hour time series station, at which the in situ incubator of the Vienna group was exposed again. The sea surface temperature decreased further. At 40°N it was 10°C and at 45°N only 6°C and now in the Bering Sea it is around 4-5°C. When writing this report, we are at station 18 and 57°N, 179° 35’E. Yesterday we visited the first station in the Bering Sea, station 17, still on the Aleutian crest and therefore only 770 m depth. The sky is cloud-covered since days but it stayed dry. It is impressive to experience here locally how cold the Pacific is in the geographically temperate zone; understandably giving the name subarctic Pacific due to this feature . When the warming effect of the Gulf Stream is missing, like in Europe, the influence of the Arctic stretches, though, fairly far south.

All stations north of 34°N exhibited a relatively high productivity of the phytoplankton, measured as chloro- phyll fluorescence, as compared to the nutrient depleted stations further south. In addition, the Bongo net tows contained large amounts of zooplankton, but only few plastic particles. The biomass production of the bacteria in the upper 100 m of the water column, however, strongly decreased with decreasing temperature further north, presumably due to the low temperature as bacterial nutrients are abundant here. In contrast, bacterial numbers in the upper 100 m of the water column strongly increased, from less than half a million to more than 2 million per milliliter. Further analyses will show why the cell numbers increased that much towards colder temperatures. In the surface sediment samples collected by the MUC cell numbers increased as well, presumably also a consequence of the higher productivity of the subarctic Pacific relative to regions located further south. The color of the sediment in the north is much more brownish, pointing to a higher content of organic matter and indicating that a higher proportion of the material reaches the sea floor. The sediment in the Bering Sea at station 18 is even olive green, presumably due to large amounts of settled and little degraded phytoplankton. An unexpected finding for the entire transect from the tropics to the Subarctic is the well pronounced oxygen minimum at depths between 300 and below 1000 m, partly with minima of only 10-20% of the near-surface values. In the Bering Sea it appears to be well pronounced as well.

This will be the last weekly report of our cruise SO248, as it ends next Friday, June 3rd, in Dutch Harbor, the most important fishing harbor of the Aleutian Islands on the island Unalaska. Ahead of us is only the north- ern most station 19 at 58° 54‘ N, 179° 20‘ E tomorrow. Both deep stations in the Bering Sea are of great interest to us because the 3900 m deep basin of the Bering Sea is well separated from and exhibit only little water exchange with the Pacific. After the station tomorrow we just need to process the last samples and then will pack all material and stow it into the boxes and containers for shipping them back to Germany and Auckland. Finally all laboratories will be cleaned. A considerable part of the material will be used again on cruise SO254 from January 29th to March 1st, 2017. This cruise will start again in Auckland and ends there and has 60°S as the southernmost location. During cruise SO254 we will continue this transect to the south such that we cover in total a transect from 60°S to almost 60°N. Thus we encompass all biogeographic provinces of the Pacific from the subantarctic to the subarctic regions and will obtain a most comprehensive insight into the composition and metabolic potential of the bacterial communities in these provinces.

At all work on deck and using winches and instruments like the CTD, MUC, the in situ pump, the profiler, and the in situ incubator, Torsten Bierstetd and his team always supported us in a most helpful way and very competent. Without their help we would not have brought any instrument into the water. Therefore I would like to thank very much Torsten Bierstedt and his team for their great commitment and their support at any time during day and night.

At the end of this cruise we will have made appr. 6500 nautical miles and, regarding the distance, one of the longest cruises with RC Sonne. Even though the cruise is not yet over and we have still a few days to go I would like on behalf of all scientist to thank very much all members of the crew for their in every respect outstanding support of our work available at any time. This is true particularly for the captain, Lutz Mallon, who, with his quiet and easy-going manner, directs the vessel most competently through all stormy and otherwise difficult conditions.

With best regards and a farewell on behalf of the

scientists, Meinhard Simon.

Foto: M. Simon