RV SONNE – SO296/2

21.1.2023 - 21.02.2023

Talcahuano (Chile) - Talcahuano (Chile)

2nd Weekly Report (22. - 29.01.2023)

On January 22, as planned, the large MOCNESS net of the Chilean colleagues could be deployed a second time, now in daylight, at the deepest station 39 (1600 m water depth). Since this huge net can only be run on a very large ship, these two deployments of the net were the first after 5 years. One can clearly see how different the distribution of fish of different sizes is within the water column, and how far the fish populations migrate during the day (Fig.1). Especially the smaller fish only dare to come to the surface at night (lower left). The one or other pretty jellyfish was also caught in the process. During a later visit of the Chilean colleagues at the IOW, investigations on the nutrition of the different caught organisms are planned, using a special method to determine nitrogen and carbon isotopes in single amino acids.

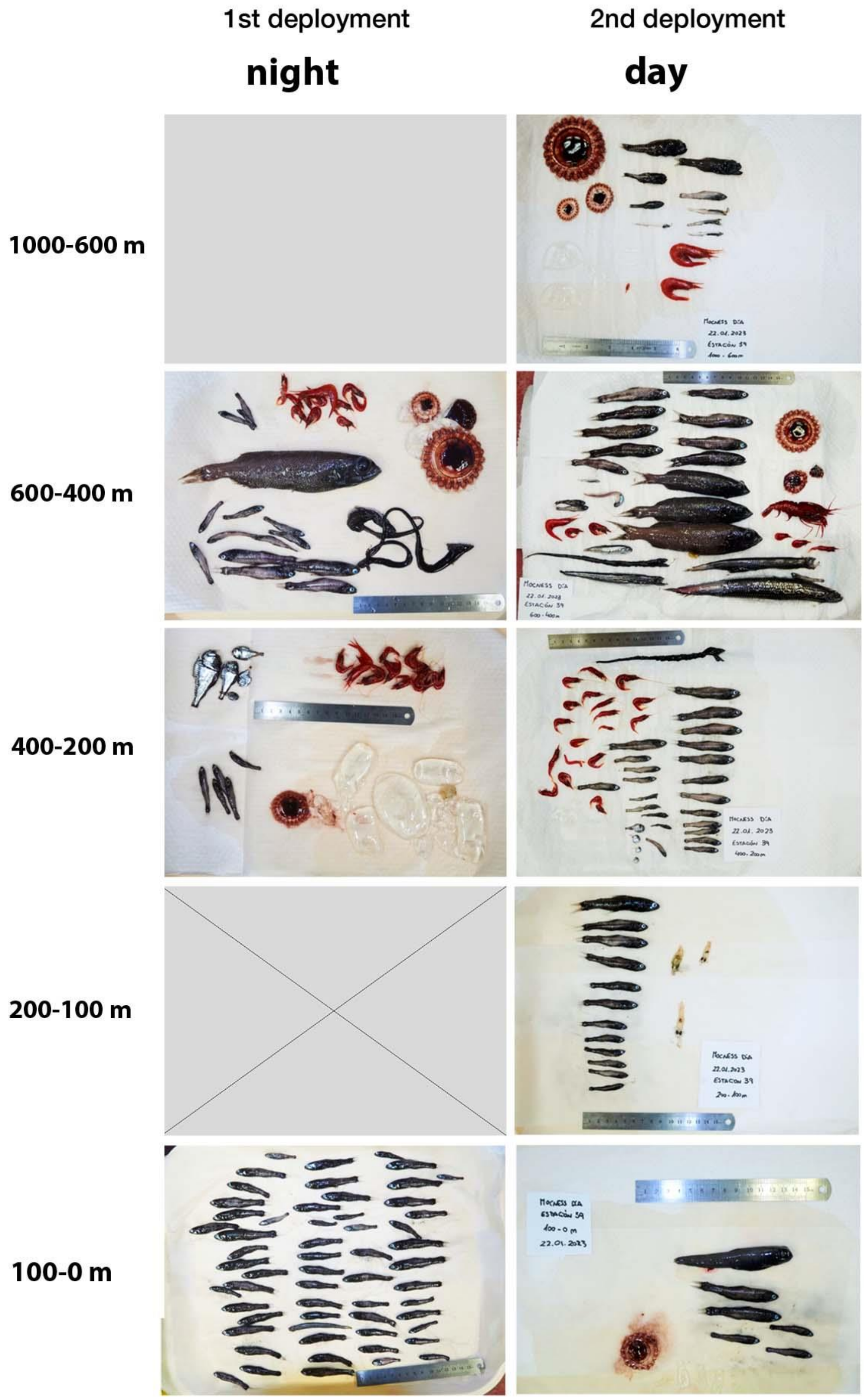

Fig.1: Distribution of fish in the water column at night (left) and during the day (right) up to a depth of 1000 m. From top to bottom the water depth decreases. Unfortunately, no sample could be obtained for the 200-100 m depth in the nighttime survey because a net was torn. (Photo: I. Fernández)

Subsequently, as planned, we started a profiling cruise from the deepest station to the coast to record the oxygen concentration and microturbulence on the shelf. It turned out that the whole shelf was covered by a more or less oxygen free water mass, which is only mixed by turbulence at the very surface (Fig.2). In agreement with to the turbulence, only the uppermost meters of the water column are really well aerated with oxygen (Fig. 2).

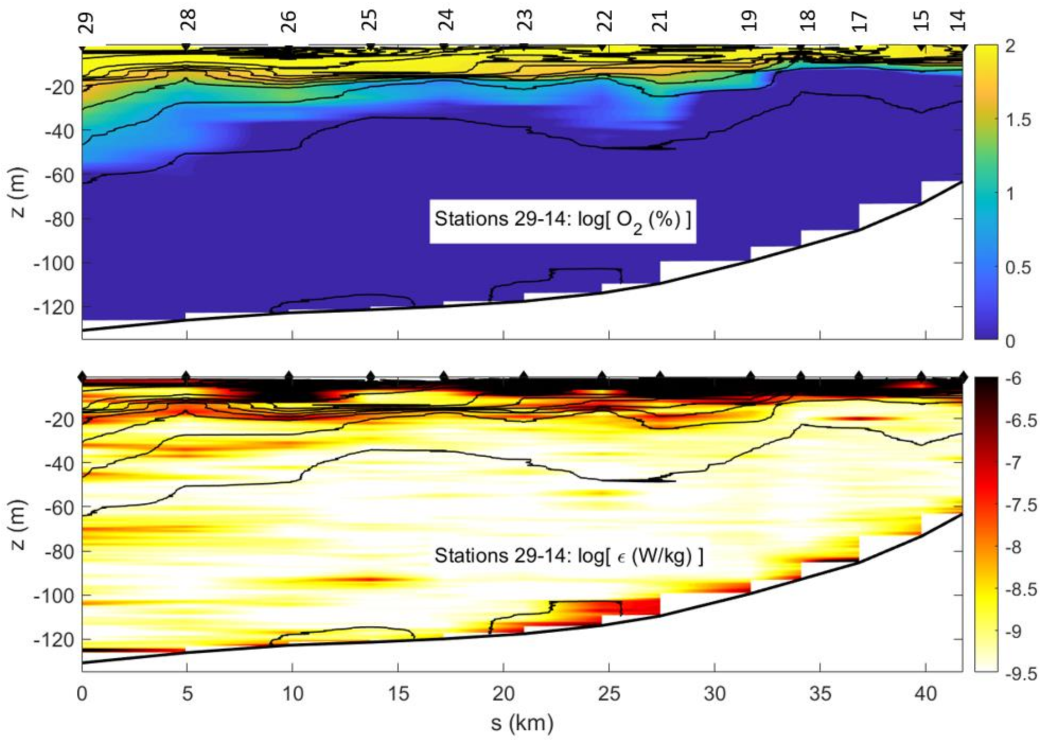

Fig.2: Measurements with the microstructure probe on the shelf from station 29 (left) to station 14 (right). Below 20-40 m, the entire shelf is covered by oxygen-poor water (top). This water mass is hardly mixed by turbulence (bottom). (Data: L. Umlauf)

According to this profile, a first main station was selected where all participating groups performed measurements or took samples. Station 18 was chosen because this position is part of the regular monitoring program of the Chilean colleagues. This is also where the IOW's pump CTD was used for the first time, which continuously pumps water into the laboratories while the head of the device is lowered through the water at 1-2 cm per second (Fig.3). Nutrients and oxygen and sulfide levels in the pumped water are then measured directly in the laboratory. In this way, these parameters can be determined with a much higher resolution than is usually possible with the rosette water sampler. In addition, samples were collected at short intervals on the effluent water for determination of cell counts by flow cytometry and for measurement of trace elements, so that the laboratory was very busy during the 3-6 hours that a pump-CTD operation lasted. Before and after each pump CTD, the turbulence in the water column was again measured with the microstructure probe to better interpret the profiles later.

Each deployment of the pump CTD was then also followed by sampling with special water samplers, which fix the bacterial population at selected depths immediately after the bottles are closed, in order to later identify the composition of the bacterial population and the active genes by sequencing the DNA and RNA. This deployment was then followed by multiple sampling with the rosette water sampler for various measurements of chemical substances and determination of turnover rates, followed by deployment of the nets to sample the zooplankton and at the end sampling of the sediment for benthological and geochemical studies. During the first leg, we were able to perform such complete sampling at a total of four stations, from directly on the shelf edge (station 31) to the nearshore station 14 with two stations in between on the shelf (18 and 26, see Fig.2A).

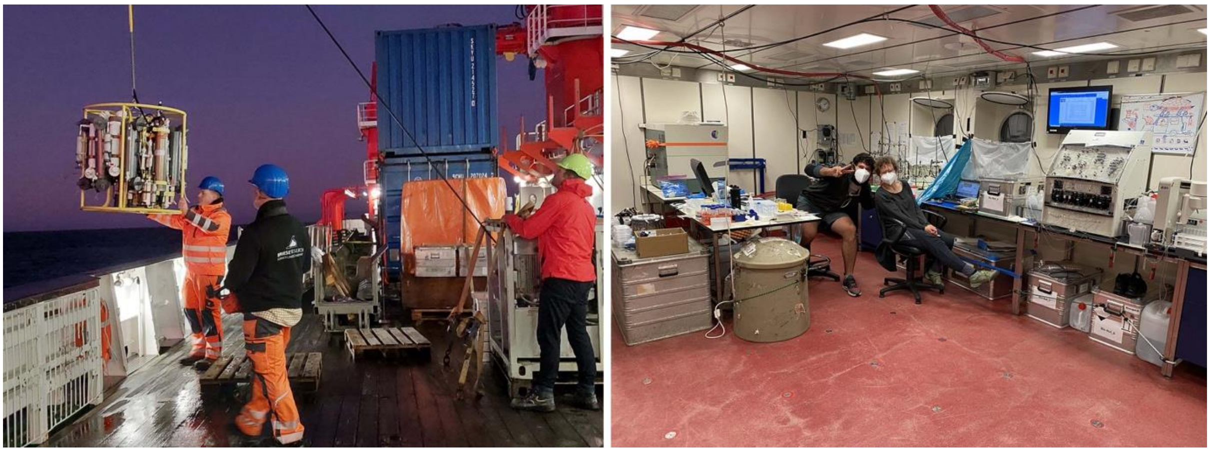

Fig.3: Left: The pump-CTD being launched into the water. (Photo M. Gogina) Right: The Pump-CTD laboratory with Christian Venegas and Jenny Fabian. On the left is a flow cytometer with which cell counts are determined at regular intervals. In the middle, a row of microelectrodes for measuring oxygen, sulfide and pH. On the far right is the auto-analyzer with autosampler, which draws samples from the water and measures nutrient concentrations. (Photo: H. Schulz-Vogt)

After initial difficulties we finally received permission to launch our drifter on the evening of Jan. 25, an instrument that measures temperature, salinity, current and oxygen while drifting freely in the water and transmits its position at regular intervals. Unfortunately, the latter did not work anymore from the moment the drifter was in the water, but after an overnight repair, the drifter could be released again in the early morning of 26.1. and picked up again in the evening of 27.1. on the way to the harbor, so that our oceanographers were finally able to obtain valuable data with this instrument at the very end of the first leg (Fig.4).

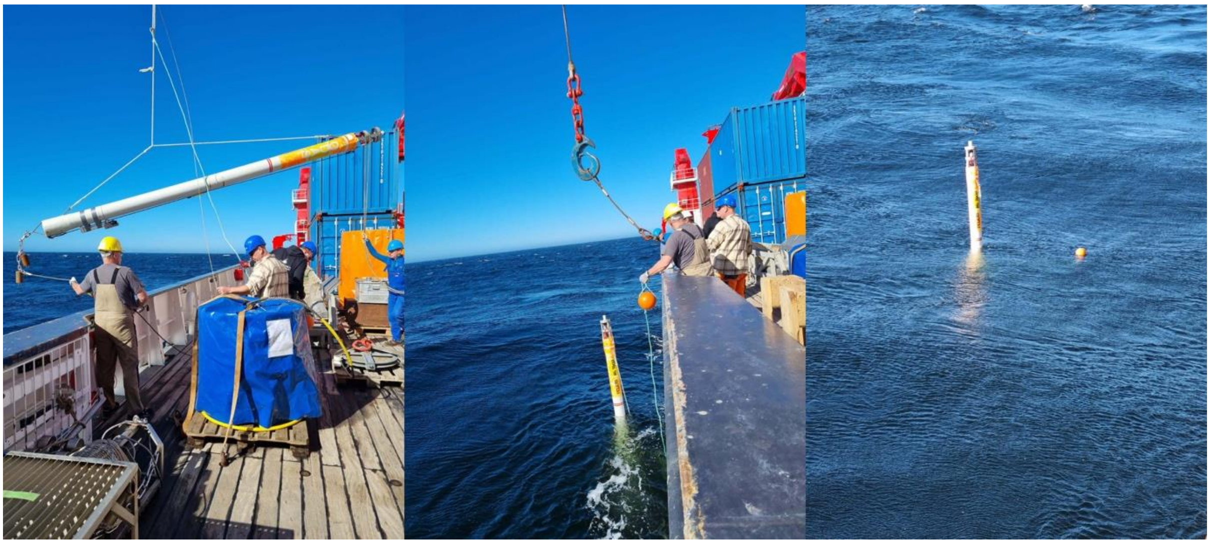

Fig.4: Toralf Heene setting out the drifter. (Photo: F. Pohl)

Punctually on the morning of 28.1. we entered the harbor of Lirquén after a last nightly measuring effort at station 14. In Lirquén 18 scientists, mainly from the field of marine biology, disembarked. They were replaced by a team of 14 paleoceanographers, again from both Germany and Chile, who will study the history of the Patagonian fjords since the last ice age in the next two working areas.

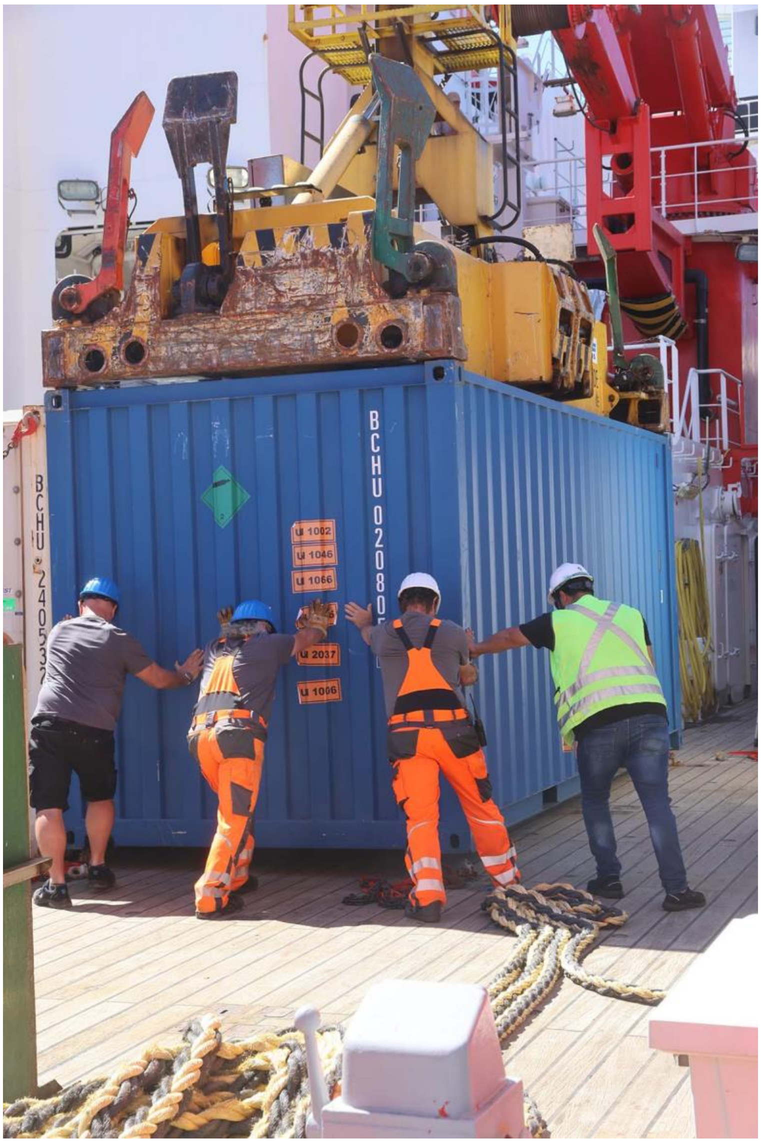

Fig.5: The last missing container is loaded (Photo: T. Heene)

Unfortunately, our departure from Lirquén was still delayed until the evening of 29.1. because neither the two pilots, without whom the fjords cannot be navigated, nor the last missing container arrived at the expected time. Now that both the pilots and the container have arrived, we are ready to cast off and also our two chemists can finally measure. Now we hope for a smooth ride to the next working area.

Greetings in the name of all participants,

Heide Schulz-Vogt

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