Ahoy from Polarstern!

After nine days at sea aboard the German research vessel and icebreaker Polarstern, we finally reached our first sampling station in the Fram Strait, located between Svalbard and East Greenland. Onboard, three members of the HADAL group, Hannah Sofie Mihm, Frank Wenzhöfer, and Lisbeth Fürst Sørensen, are part of a multidisciplinary team of 45 scientists working collaboratively to investigate the impacts of climate change on polar marine ecosystems.

This expedition continues a long term, integrated study of Arctic ecosystems, from the ocean surface to the deep seafloor. The research has since 1999 contributed to the time program at the LTER (Long Term Ecological Research) observatory HAUSGARTEN, which includes 21 stations along both depth and longitudinal gradients across the Fram Strait. One of these stations, the Molloy Deep, reaches depths of up to 5500 meters.

Last year, members of the HADAL group, Ronnie N. Glud, Frank Wenzhöfer, Peter Stief, Wenjie Xiao, Yick Hang Kwan, Yen-Ting Chen, and Lisbeth Fürst Sørensen, participated in the PS143/1 expedition to investigate the deepest part of the Arctic Ocean, the Molloy Deep. The HADAL group wants to use the Molloy Deep as a model area to quantify the carbon mineralization in the sediment and at adjacent shallower reference sites, identify the key players in the processing, and compare process rates and microbial communities with other deep sea and trench ecosystems. We found that the Molloy Deep, similar to hadal trenches, exhibits elevated rates of organic matter mineralization, with a large contribution from anaerobic processes compared to shallower reference sites. We also observed that deep sea microbial communities brought to the surface retain a clear preference for their native high pressure conditions, highlighting the importance of understanding how pressure influences microbial metabolic activity.

One of the key research objectives on this year's cruise is to deepen our understanding of how pressure influences microbial processes in deep sea sediments. On board the ship, we are equipped with 12 custom-built pressure cylinders, produced by the workshop at SDU, which will be used for a series of high-pressure experiments with pressure up to 100 MPa. At the moment, sediment samples from the Molloy Deep, enriched with ^{15}N and ^{35}S tracers, are being incubated under varying pressure conditions up to 100 MPa. These experiments aim to examine how key microbial processes (denitrification, anammox, and sulfate reduction) respond to changes in pressure. Frank and his team from the Alfred Wegener Institute (AWI) have already deployed in situ oxygen profiler landers. Please see the beautiful in-situ photos taken from Kazumasa Oguri's cameras.

When we are not working in the cold room, we often find ourselves on the bridge watching for wildlife. So far, we have been lucky to spot sperm whales and packs of orcas. Yesterday, we entered the sea ice, and not long after arriving at our first ice station, a curious visitor came by to see what we were doing. A female polar bear - she wandered around the ship, seemingly inspecting our work with great interest before continuing on her way across the ice.

If you are further interested in our work, please have a look at our HADAL website (https://www.sdu.dk/en/forskning/hadal) or stay updated with news from the official Polarstern app (https://follow-polarstern.awi.de/?lang=en).

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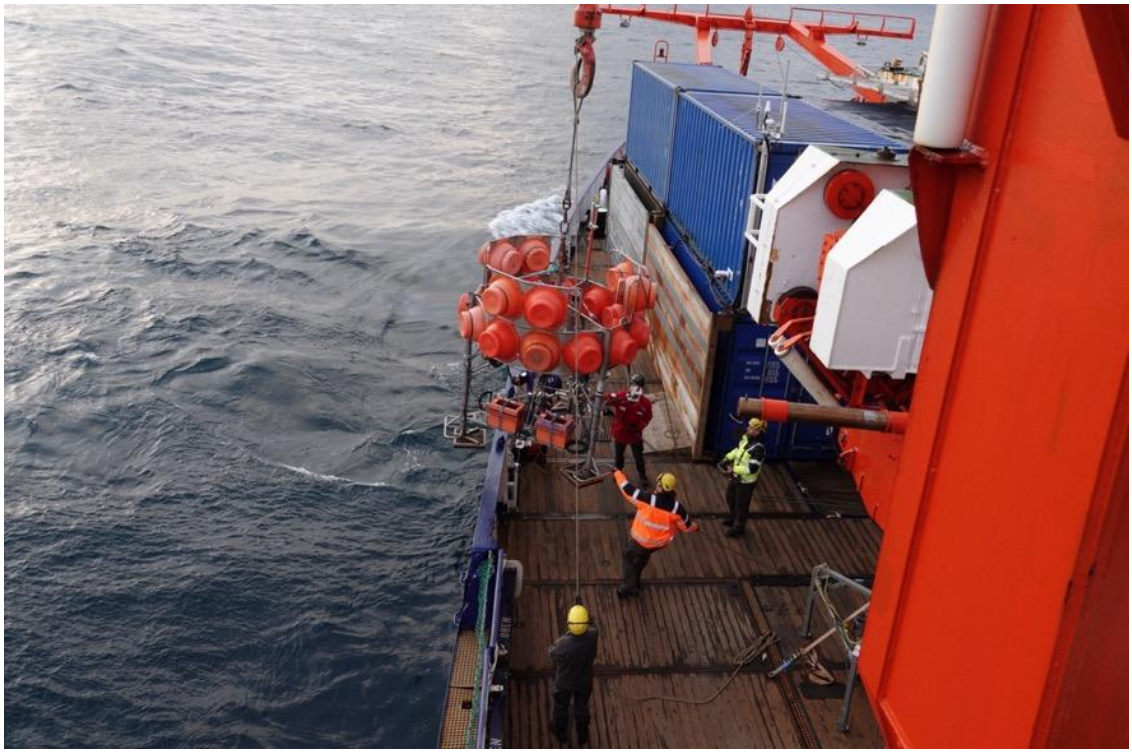

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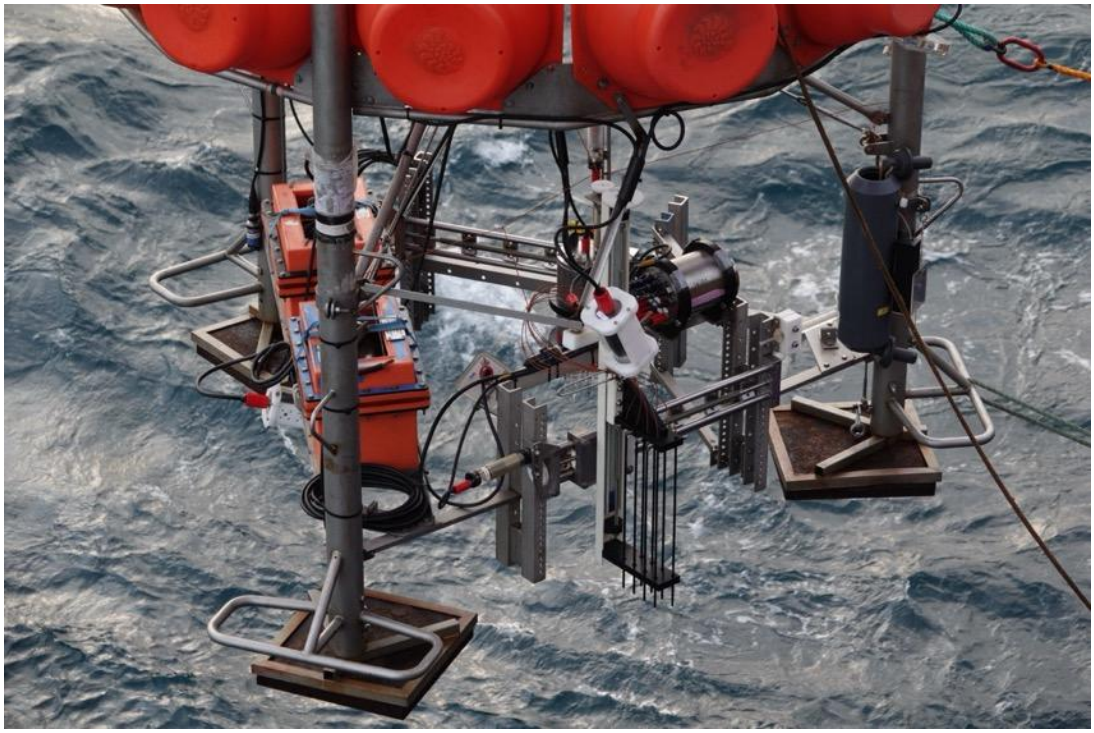

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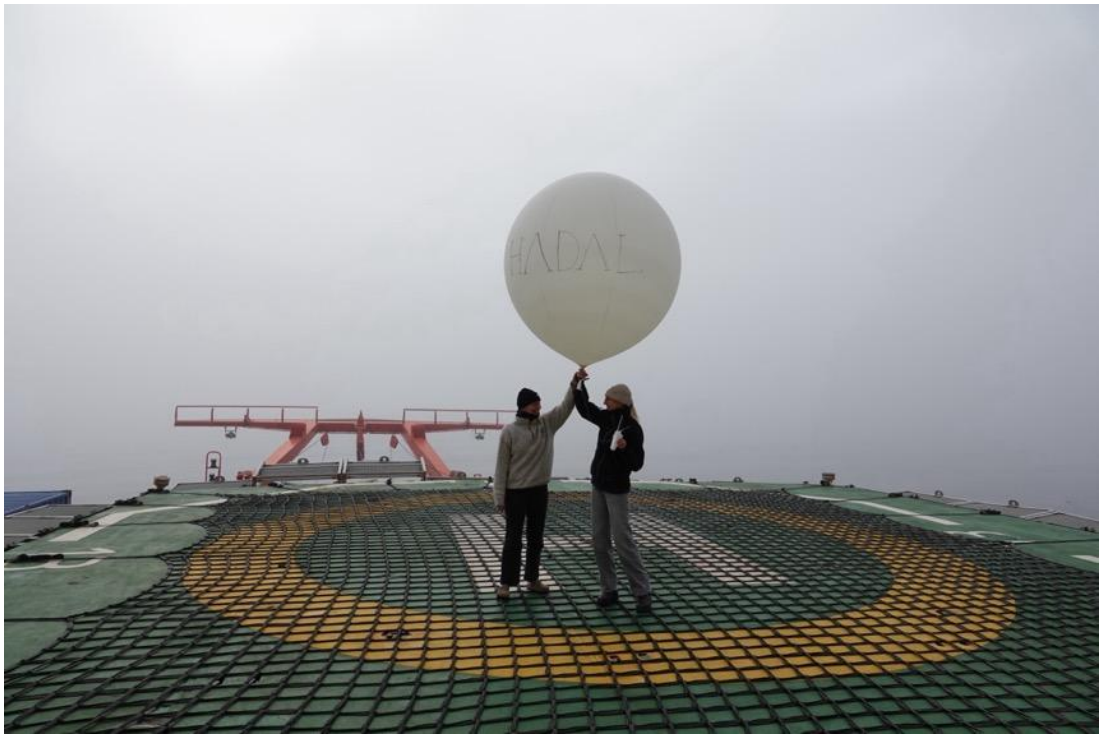

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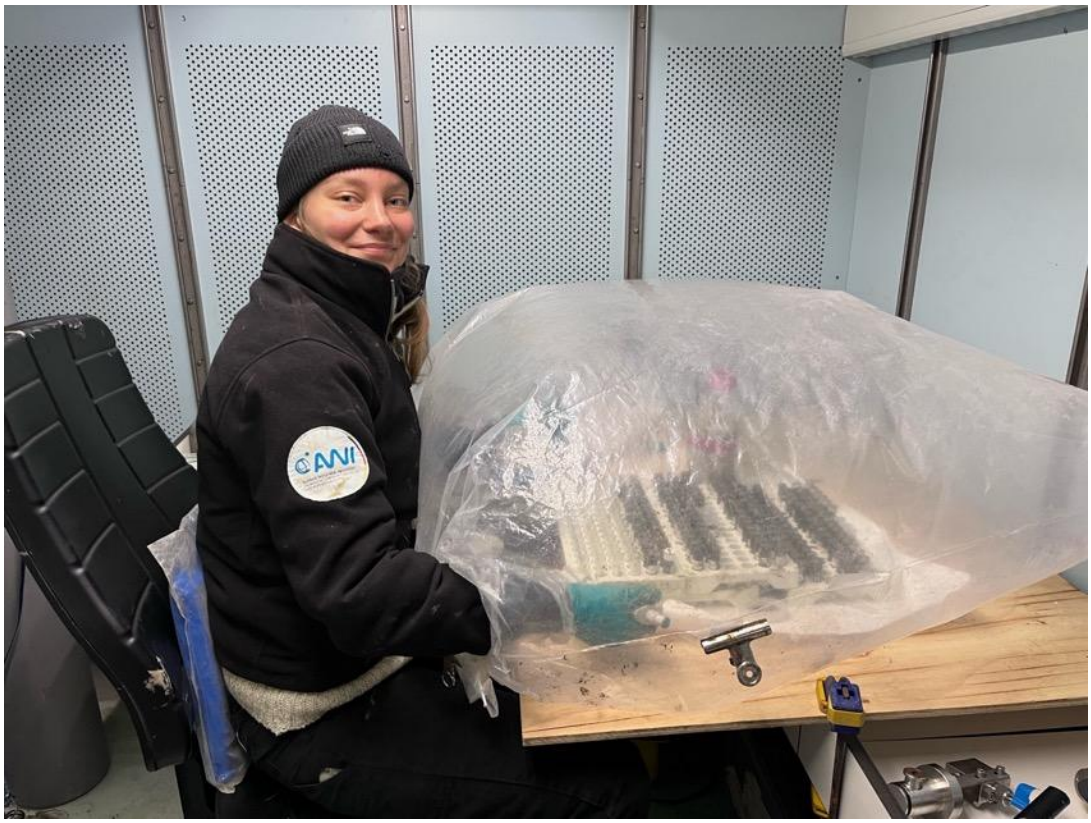

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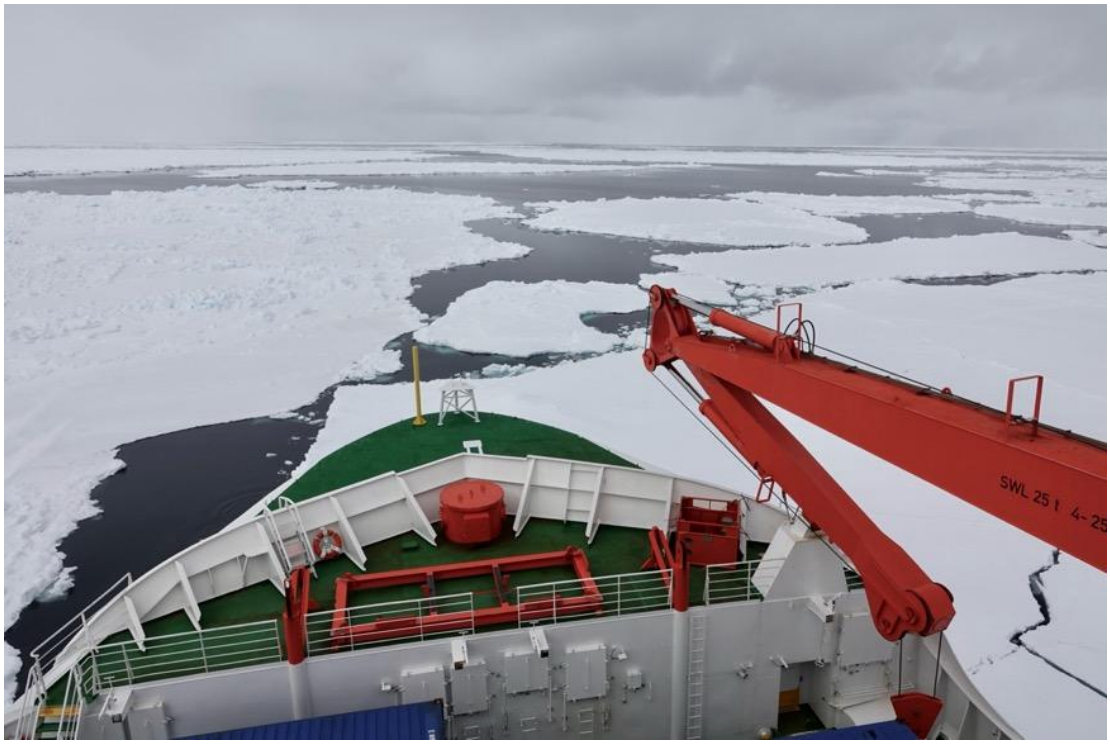

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