RV SONNE Expedition SO317
MANGAN 2026

28.12.2025 – 19.02.2026
San Diego – San Diego (USA)
4th weekly report (20.01.2026 – 26.01.2026)

We have already reached half-time of the cruise SO317. The past week has passed rapidly with multiple deployments of all the equipment that we have brought on board, as well as the ship's Ocean Floor Observation System (OFOS) and the ship's CTD-rosette. The week started with two approximately 9-hour deployments of OFOS in the Patania II Trial Site and in its corresponding Reference Site, situated about 8 kilometres away. The OFOS, with its downward-looking video and still cameras, allows quantitative analysis of all fauna that can be identified visually on the seafloor (megafauna). The results show that the numbers of megafaunal specimens in the collector impact area 4.5 years after the disturbance are still greatly reduced compared to both the surrounding pristine and plume-impacted areas (<10%). Whereas the composition of the fauna at higher taxonomic levels is similar in the reference and plume-impacted areas, clear differences are observed in the mined area. In very general terms and as can be expected with a removal of nodules as substrate, relative abundances of sessile organisms such as anemones, corals and sponges are reduced in the areas cleared of nodules, in favour of mobile detritivores and carnivores such as brittle stars, sea cucumbers, worms and shrimps. For the smaller animals that make up most of the biodiversity in the area and generally live in the topmost seafloor sediment, sediment sample processing and analysis will occur in the home laboratories in the upcoming months.

From Tuesday to Thursday, we worked in an area in the south-eastern part of BGR's Prospective Area #1, which we have selected as a potential "Preservation Reference Zone" (PRZ) in accordance with ISA legislation and terminology. A PRZ should have similar geological and ecological conditions to the area selected for mining, thus functioning as a control or reference site against which the scales of impact can be measured. We carried out standardised box core and multicore sampling for faunal and biogeochemical analyses in this area, as well as two epibenthic sledge deployments for the collection of large amounts of epi-fauna for genetic (diversity) analyses. Furthermore, the entire water column was sampled for its trace metal, oxygen, carbon and nutrient content. A 6-km OFOS transect indicated a relatively high abundance of sea urchins in this area compared to the transects before. As this area was also visited and sampled during a BGR cruise in 2023, we have now started a new time-series analysis of fauna in this area, to be continued in upcoming years.

On Thursday evening, we started work in an area that has been selected for a potential trial of Impossible Metals' autonomous AUV collector Eureka III. A full photogrammetric and photomosaic analysis of the envisaged test area was carried out during two ca. 25-hour ROV dives. We continued to sample the megafauna for diversity studies as well as the assessment of metal accumulation under natural conditions. In addition, a series of *in situ*

ecotoxicological experiments was started by placing ecotox-chambers (cubes) over sea anemones by ROV, which were consequently contaminated with a mixture of seafloor sediment and crushed nodules to mimic a sediment plume. After 12 hours, a second contamination was carried out. After a further 24 hours, the anemones were sampled for analysis. Two baited amphipod traps were deployed for the same purposes and with similar contaminations. In the home laboratories, bioaccumulated metals in the tissues and RNA and protein biomarkers will be analysed and compared to a corresponding control group to provide indications of rapid plume-related stress or damage.

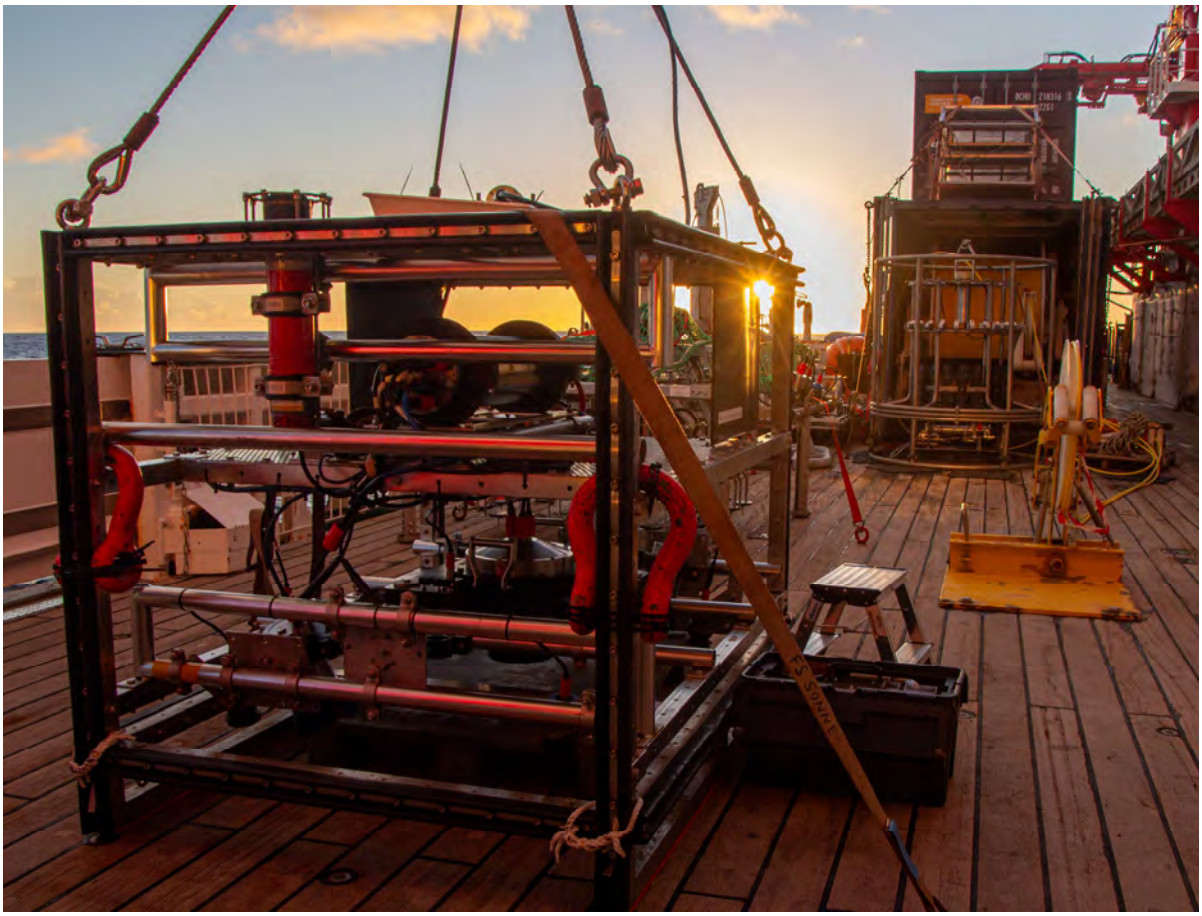
During the upcoming week, we will carry out comprehensive biogeochemical, biological and ecotoxicological analyses in the Patania II Reference Site, which also functions as a Reference Site for the future Eureka III test. The work will involve ROV-controlled deployments of oxygen micro-profilers, benthic chambers, an eddy covariance system, passive samplers, a time-lapse camera, and the ecotox experiments as described above. This will involve more than 50 hours of ROV work on the seafloor and day and night shift work in the ROV control van. In between ROV dives, we continue to use the box corer, multicorer and CTD/rosettes to collect sediment and water for the determination of baseline bio(geo)chemical, physical and biological conditions in the seafloor sediment and the water column, respectively.

At this half-way time, I would like to acknowledge and thank all involved parties on board (ship's crew, ROV team, science team) for their hard work and excellent solution-driven attitude towards collectively reaching our project goals during this cruise.

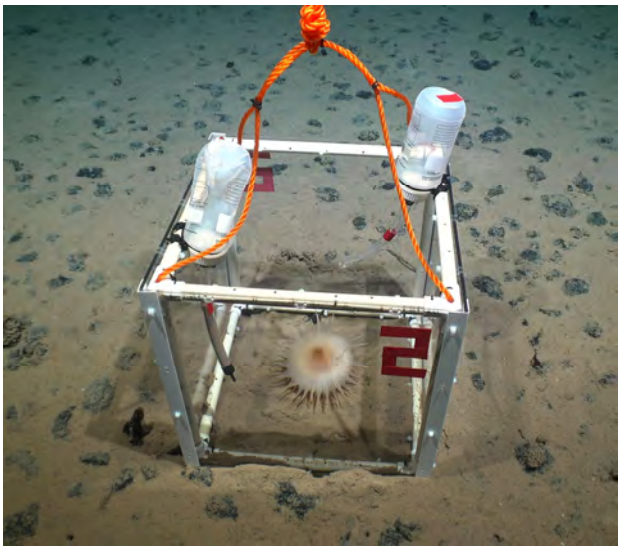
On behalf of all participants, I send you sunny greetings from onboard the SONNE,

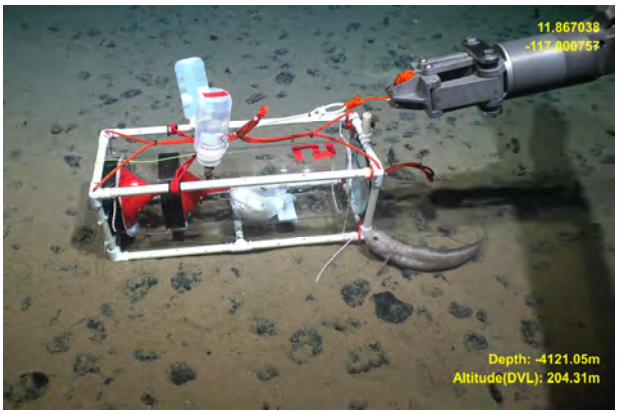
Annemiek Vink
(Chief Scientist SO317)

Left: A video-supported 20-core multicorer brings short sediment cores from the seafloor to the deck of the vessel (photo: Simone Sturm). Right: Laboratory technician René Herbst processes geochemical samples from the multicorer in the cold lab (photo: Robert Sommerfeldt).



Right: SONNE's OFOS stands ready for a night-time deployment as the sun sets in the Pacific (photo: Robert Sommerfeldt).





Upper left: The ROV Odysseus is recovered to deck after a dive (photo: Mirja Bardenhagen). Lower Left: a sampled Holothurian (sea cucumber) is removed from the biobox of the ROV (photo: Simone Sturm). Upper right: An ecotox-chamber is placed over a sea anemone and contaminated with a natural sediment plume (bottles) for 48 h before sampling for ecotoxicity assessments. Lower right: amphipods attracted to fish bait are trapped and contaminated with natural sediment, also for ecotoxicity assessments.