

# RV SONNE Expedition SO317 MANGAN 2026

28.12.2025 – 19.02.2026

San Diego – San Diego (USA)

3<sup>rd</sup> weekly report (12.01.2026 – 19.01.2026)



During the past week, about half of our time was spent sampling sediments and fauna as well as carrying out measurements and *in situ* experiments on the seafloor using Pelagic Research Services' ROV Odysseus. The ROV Dives 5 and 6 in the Patania II collector test site (both the directly mined site and the site of thick plume deposition) lasted 34 and 43 hours, respectively, and each included several deployments and recoveries of our ca. 2 x 2 m subsea baskets to transport equipment to and from the seafloor. Short-term deployed tools include three oxygen micro-profilers, three benthic chambers, an eddy covariance system, a 24-hour baited time-lapse camera lander, and a 24-hour baited amphipod trap that recovered hundreds of specimens. Furthermore, another time-lapse camera lander with enhanced battery capacity was deployed for a time period of three weeks to take snapshots of the seafloor at 5-minute intervals. This lander will be retrieved at the end of the cruise in ca. 4 weeks' time. In addition, meiofaunal emergence and recolonisation traps were placed on the seafloor that will also be collected at the end of the cruise. The time between basket transports is generally spent with positioning tools on the seafloor, as well as sampling the seafloor sediment and megafauna by push core, suction sampler, or with scoops and nets. The focus of megafaunal sampling is on holothurians (sea cucumbers), porifera (sponges), actinarians (anemones) and ophiuroids (brittle stars), which will consequently be used for morphological and genetic (diversity) analyses and for ecotoxicological assessments of baseline and impact-related metal accumulation and biomarkers that are indicative of stress or damage. In total, more than 38 animals were collected this week, although a few very active holothurians managed to escape from the biobox before the ROV surfaced.

In addition to the scientific work described above, the site of a BGR sediment trap mooring that had been deployed 2.5 years ago but surfaced unexpectedly on 11<sup>th</sup> August 2025 was inspected by ROV to identify the single point of failure and to possibly recover any remaining mooring equipment on the seafloor. We found that the mooring had broken due to shackle corrosion right above the double releasers, thus setting the mooring assets (trap, current meters, floats) free. These have been floating around the CCZ for the last 5 months and still send us daily iridium positions, unfortunately about 1000 km north-westwards from our current position and thus too far away for recovery. We have not seen such severe hardware corrosion in any of our long-term moorings in this area before. The releasers were salvaged and recovered to deck.

Work on the seafloor at a water depth of around 4100 m, including hooking and unhooking subsea baskets by ROV from the ship's heave-compensated cable, removing and repositioning tools from/onto the baskets and fastening them with bungies for their safe

transport through the water column, as well as the sampling process itself requires great skill, precision and patience from the ROV pilots and their navigational survey team, as well as dedicated bridge support. We have optimised the procedures and time requirements for the multiple actions involved and established a work flow that allows us to introduce more routine into the deployments on the one hand, but also to maximise time use and efficiency on the other hand.

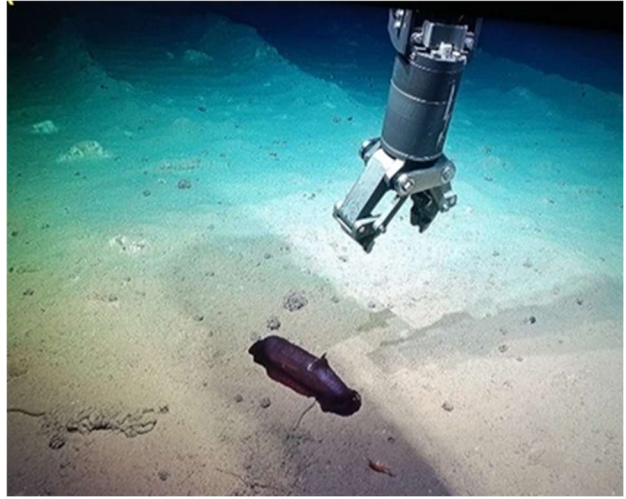
In addition to ROV deployments, 12 TV-guided multicorer, 6 box corer and 2 ultra-clean trace metal CTD-rosette deployments were carried out to complete our sampling of the Patania II impact sites as well as a site where we have carried out time-series faunal analyses since 2013. For faunal analyses, the top 5 centimeters of multicores including nodules are preserved in different fixatives to carry out metabarcoding (diversity) studies of the meiofauna once back in the home laboratories. Further multicores are sampled and preserved immediately for comprehensive biogeochemical assessments of eDNA, phytopigments, trace elements, nutrients, and oxygen and carbon concentrations. The box cores, on the other hand, are split into three layers (0–3, 3–5, and 5–10 centimeters), which are consequently sieved and preserved in ethanol for morphological analyses of the slightly larger macrofauna in the seafloor sediment. The nodules themselves are weighed and size-measured for the validation of detailed resource assessments that have already been carried out in this prospective sub-area of the eastern BGR contract area. Six box cores taken only ca. 50 m apart in the area of heavy plume impact confirm previous BGR estimates that there is, on average, a relatively high variability in nodule abundance on the seafloor of ca. 20% (av.  $20.6 \pm 2.0$  kg/m<sup>2</sup> wet wt. in the samples measured here).

As of today, we are carrying out similar ROV and sampling work in the Patania II reference site, which is located just 8 kilometers south of the impact site. Already, valuable measurements and samples have been secured that will provide for many months of processing and analysis once back in our respective institutes in Germany.

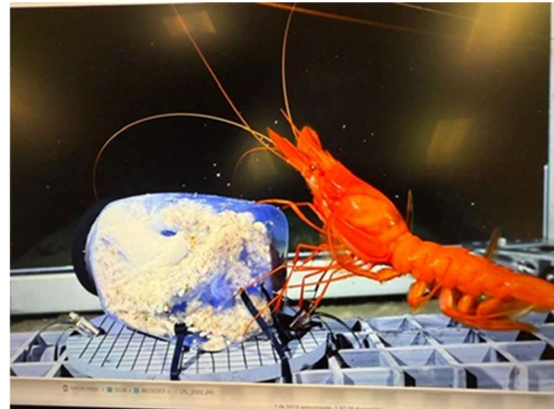
Warm regards from the Pacific Ocean, and on behalf of all participants,

Annemiek Vink

(Chief Scientist SO317)



*Left: a sponge stands tall in the plume impact area, with a brittle star wrapped around its stalk. Right: a sea cucumber in the tracks of Patania II is about to be sampled by ROV.*



*The baited time-lapse camera captures images of animals that are attracted to the fish bait in the plastic jar.*



*A whale shark (largest known fish species) swims by, along with a dozen whitetip sharks that have accompanied us for many days.*