SO290 Paleoceanography of the Tasman Sea

RV SONNE

SO290 – Paleoceanography of the Tasman Sea

11th April – 12th May 2022

Nouméa (New Caledonia) – Nouméa (New Caledonia)

2nd Weekly Report

(18th April – 24th April 2022)

We proceeded our transit from New Caledonia into the Tasman Sea and arrived on 18th April after ~2.5 days and ~1000 nm (1800 km) of steaming in our first working area. The transit was unfortunately not quite as we had expected for a subtropical ocean. We encountered a persistent zonal band of ~3-4 m wave heights following our track southward. Consequently, the ship´s doctor had to prescribe sea sickness pills to some of the scientists, which luckily improved their sea sickness. The bad weather fortunately calmed down towards the end of the transit.

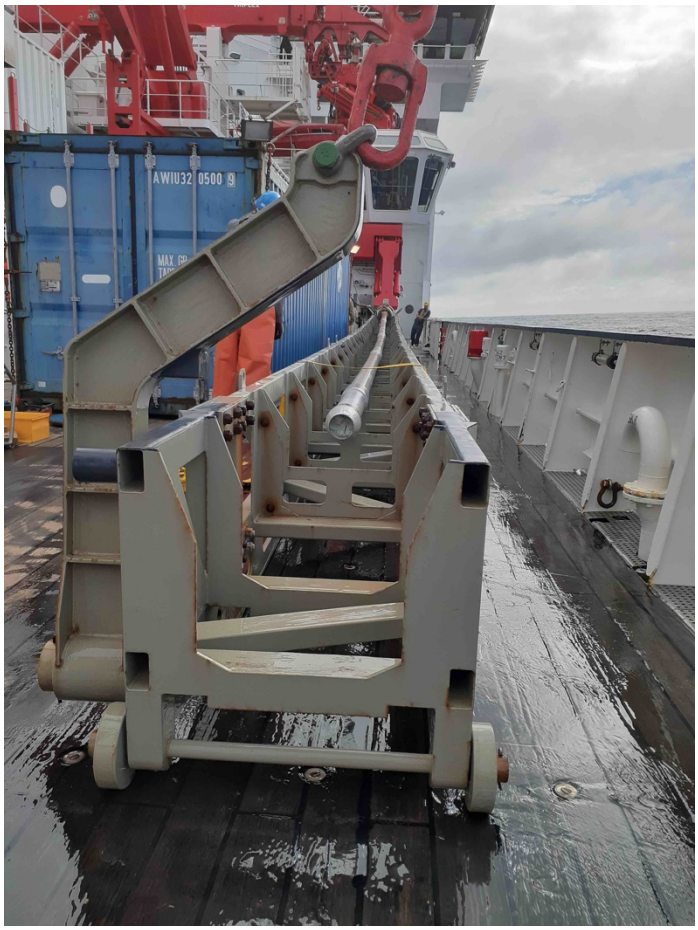

Fig. 1: First deployment of piston corer (Picture: SO290, M. Toyos, CC BY 4.0)

We started station SO290-1 on the 18th of April at the southern edge of the Lord Howe Rise, a large deep-sea plateau extending northward to southwest of New Caledonia. Together with the adjacent Challenger Plateau, both are part of ancient Zealandia that separated from the Gondwana Continent some 80 million years ago. Nowadays, only New Caledonia and New Zealand are still land, whereas more than 90% of the old Zealandia continent is now submerged. Station SO290-1 is located far away from land and therefore does not receive any input by rivers. The only source for continental material is the input from dust originating from deserts in Australia, which partly falls out from westerly winds that subsequently proceed across New Zealand towards the southwest Pacific,

providing important nutrients for plankton growth in the Southern Ocean. Investigating changes of dust input in the Tasman Sea provides information on dust variability relatively close to the Australian sources and allows to estimate the relative importance of Australian versus New Zealand dust for the Southern Ocean fertilization. We performed our complete program at the first site, including oceanographic devices, such as the CTD and optic profiling measurements, a multi-corer for recovering undisturbed samples of the upper 20-40 cm of the sediment, and finally a sediment corer. Sediments at the first station were very compact and our gravity corer only recovered ~2.5 m of carbonate-rich whitish sediment from a water depth of ~1650m.

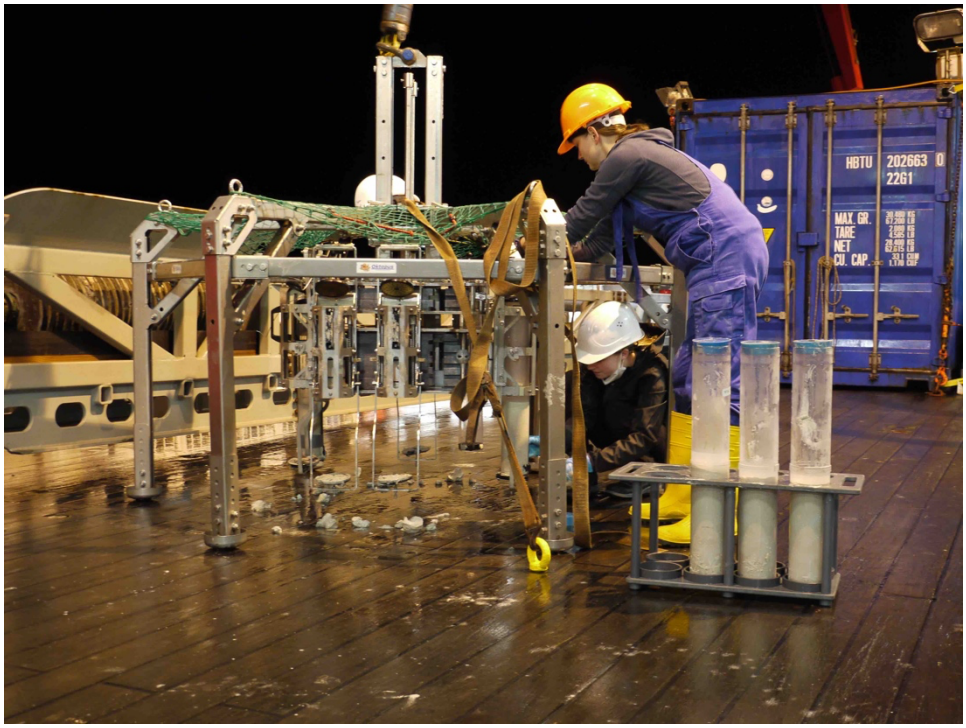

Fig. 2: Nightly deployment of the multicorer and recovery of tubes (Picture: SO290, K. Pahnke, CC BY 4.0)

From the Lord Rise, we proceeded south to deeper water and reached station SO290-2 at a water depth of ~3150 m. Due to weather constrains, we only deployed the multi-corer and the gravity corer (barrel length 10 m). Both devices were successful and we recovered a 7m-long sediment core. From here on, we headed southeast across the Challenger Plateau towards New Zealand. The purpose of this transect was to obtain oceanographic data (CTD, etc.) and sediment cores from different water depths and increasing temporal resolution approaching land. For the sediment work, our goal is to find spots of continuous undisturbed sedimentation, which we know provide the best potential for different paleoceangraphic and paleoclimatic reconstructions based on a large variety of proxies.

The oceanographic and geological work on this first transect was very successful. We obtained water samples and oceanographic measurements at ~1600 m (SO290-3), ~1000 m (SO290-4), ~910 m (SO290-5), and ~630 m (SO290-6) water depth. The two shallower sites allowed for piston corer deployment and we recovered long cores with ~15.20 and ~16.20 m length.

An additional shallower site (SO290-7 at ~330 m water depth) was not cored as the multicorer recovered sandy sediments not suitable for long coring. The search and selection of suitable coring sites is only possible through the hydroacoustic instruments installed on RV SONNE, especially the so-called HYDROSWEEP and PARASOUND systems. Whereas the HYDROSWEEP system yields surface information from the seafloor, the PARASOUND system allows us to evaluate the thickness and geometry of the upper sediment layers. These hydroacoustic data are gathered continuously during pre-defined transects and during transit between stations. The work at this northern transect off New Zealand was completed on the 21st of April and we started to head southwest parallel to the coast.

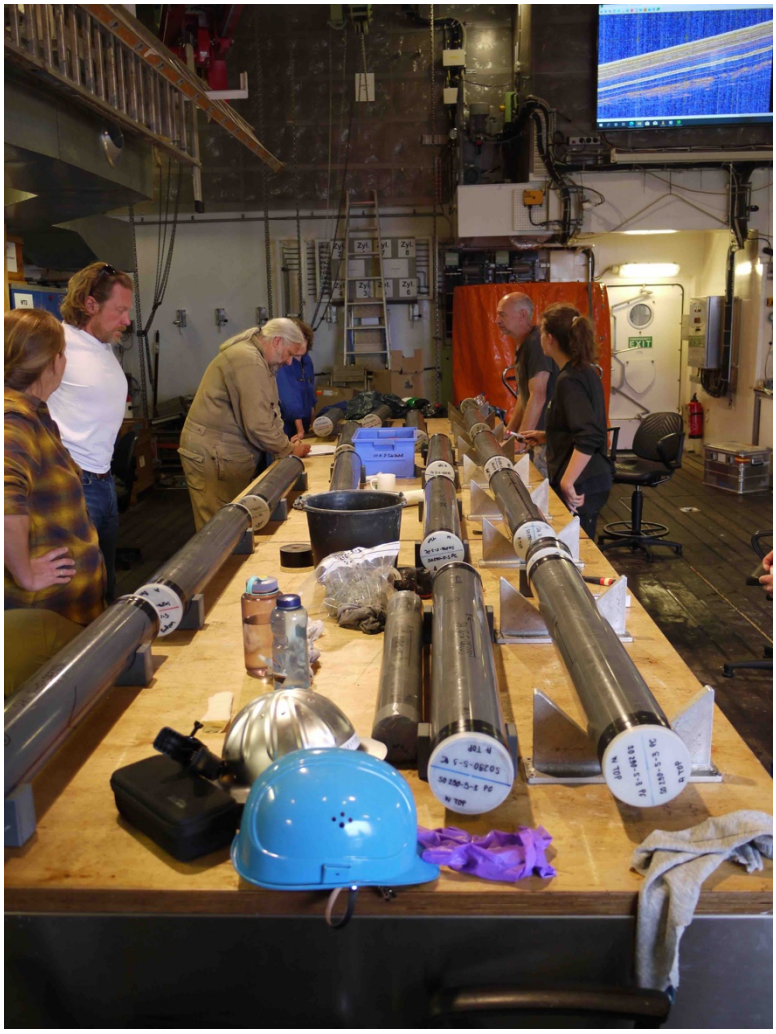

Fig. 3: Sections of first piston core on the table (Picture: SO290, K. Pahnke, CC BY 4.0)

On our way southwestward, weather and sea conditions deteriorated substantially (waves 4-5 m, wind 8-9 Beaufort) and we had to abandon station work and proceeded with PARASOUND and HYDROSWEEP surveys along the uppermost continental slope of New Zealand. Unfavorable conditions proceeded on the 22nd of April and through the night to the 23rd of April and we had to weather the storm drifting further southwest. In the morning, wind and sea conditions slightly improved and we started our second transect down-slope with three stations at water depths of ~1000 m (SO290-9) with CTD, multicorer, and gravity corer. PARASOUND showed a high acoustic penetration suggesting a thick sediment cover. We recovered an ~8m-long sediment core but, due to weather, could not deploy the piston corer. We are hoping to get back to this site on our way home in ~2 weeks from now. The again worsening weather conditions allowed us only to deploy CTD and multi-corer at water depths of ~1400 m (SO290-10) and ~3000 m (Station SO290-11) further along our transect into deep Tasman Sea.

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All participants are fine and adapted well to life at sea, despite the partly difficult weather conditions. Corona measures have been strictly applied until the end of the 2nd week. PCR tests of all scientists and the ship crew stayed negative and we are happy to release corona measures onboard now.

Greetings from RV SONNE at 43°S, 168°E!

Katharina Pahnke
ICBM, University of Oldenburg

Frank Lamy
AWI Bremerhaven