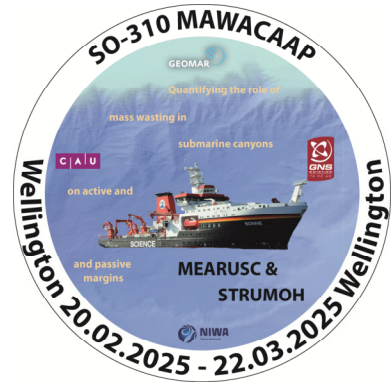


FS Sonne

Cruise SO310 (S-555)

20.02.25 – 22.03.25, Wellington – Wellington

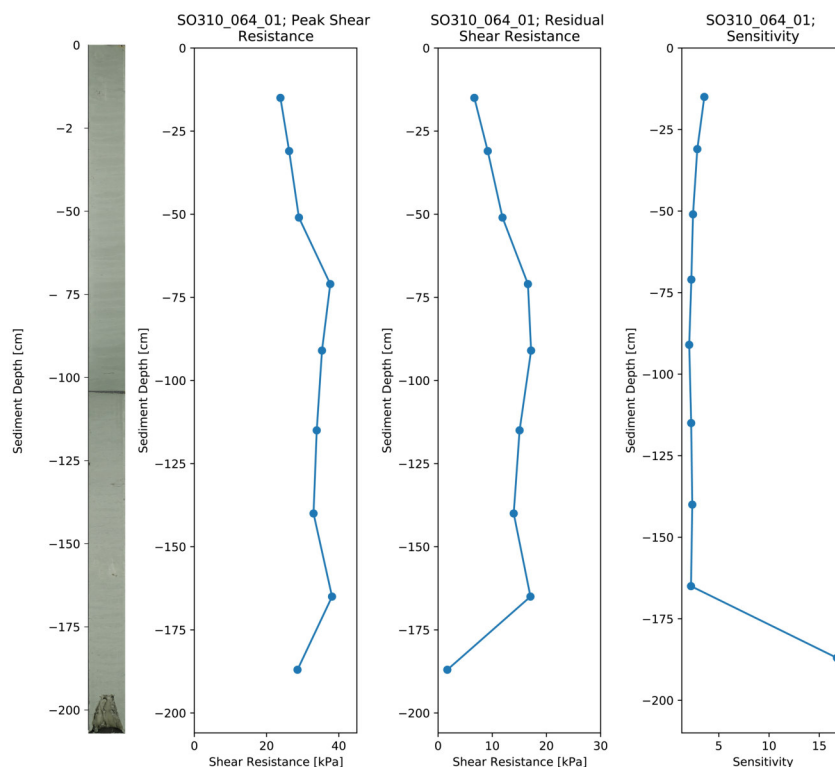
Weekly Report No. 5, 17.03. – 22.03.03.2025



Quantifying the role of mass wasting in submarine canyons on active and passive margins (MAWACAAP)

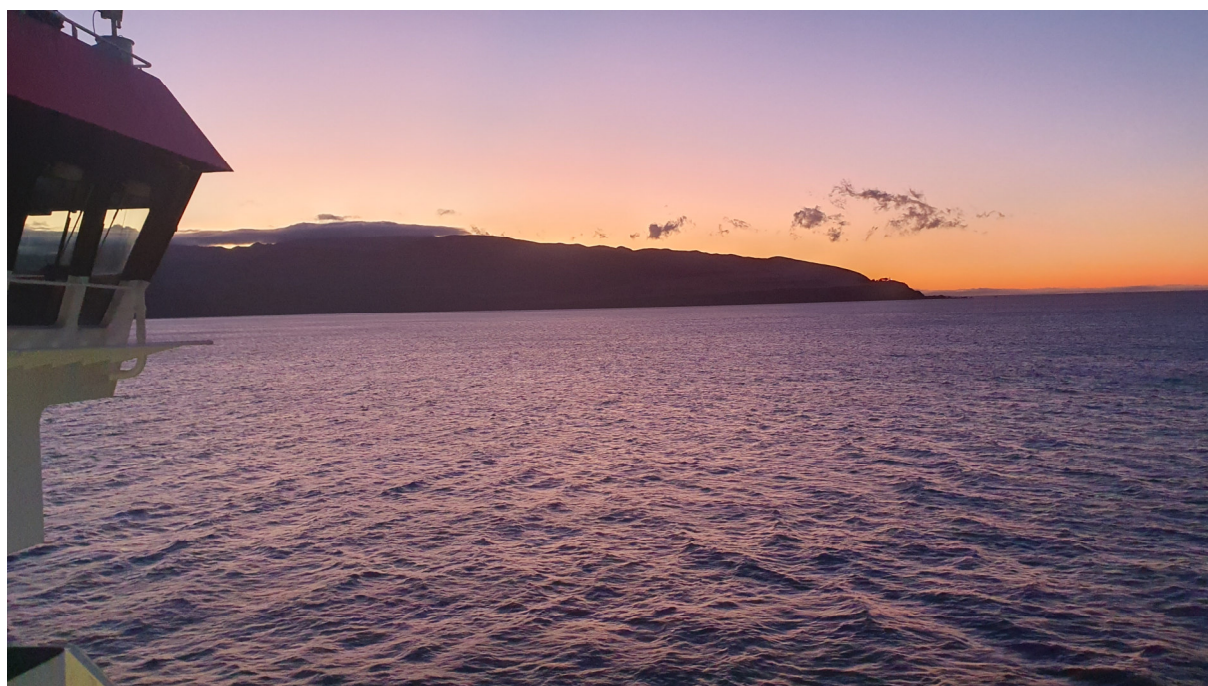
5. Weekly Report

Even though we often heard words like low pressure systems and stormy winds from our meteorologist on board this week, we were able to complete our work successfully though we lost some time due to the weather conditions. On the one hand, we have continued the initial analyses of the data we have collected so far, e.g. first geotechnical tests. We performed shear vane tests on a set of cores from Palliser Canyon. During the shear vane test the maximum undrained shear strength (Su_{peak}) and the residual shear strength (Su_{res}) were measured. Sensitivity values (St) were determined through $St = Su_{peak} / Su_{res}$. Su_{peak} . The figure below shows the results of the shear vane test on Core SO310_064. The shear resistance increases for both peak and residual shear resistance with increasing sediment depth to a sediment depth of 71 cm. Below 71 cm the shear resistance is constant with depth. This is most likely the result of sediment compaction and was also observed in the other tested cores. The last measurement that was carried out at a sediment depth of 187 cm is considerably weaker for both peak and residual shear resistance compared to the previous measurements. This is most likely due to the core catcher. The core catcher was located close to the point of measurement and most likely damaged the sediment internally making it weaker than the intact sediment located above. The sensitivity values are constant with depth except for the last measurement due to the above-mentioned reason. Thus, the sensitivity values indicate that peak and residual shear resistance develop similarly with increasing sediment depth.



Example of first geotechnical tests on Core SO064_01

On the other hand we continued the acquisition of new data. Based on the weather forecast, we set off for Pegasus Canyon again at the end of last week as more favorable conditions were predicted for this area. The seismic equipment was deployed at 08:00 on 17 March, but the start of data acquisition had to be delayed several times due to marine mammals in the vicinity of the vessel. We finally started acquiring data around midday, but the wind picked up rapidly with gusts of 9 Beaufort and above, and we had to retrieve the gear due to the stormy weather conditions. We continued to acquire Parasound data along the canyon axis until the morning of 18 March. The 2D seismic system was deployed again at 08:00 on 18 March. We ran a seismic line along the axis of the Pegasus Canyon and the data nicely shows the importance of faulting in the canyon area. Unfortunately we had to stop the seismic data acquisition at 15:00 because the wind was predicted to pick up very suddenly and we already had significantly higher wind speeds. We continued with some hydroacoustic profiling in the Kaikoura Canyon area, but had to stop this profiling as the wind increased to 10 Beaufort and above. As the storm continued to intensify, we moved east out of the area with the highest predicted wind speeds and weathered the storm there. At 12:30 the next day the wind had decreased and we started a transit to the Palliser region, where we arrived in the evening. During the night we acquired a seismic line across the Opouawe Bank. We deployed the P-cable on the morning of 20 March and continued to collect data successfully until the early morning of 21 March, when we had to stop the survey to start packing our equipment. This final survey allowed us to fill existing gaps in the 3D-seismic cube. Final hydroacoustic data were collected in the Pegasus region until 21:00, when we started the very short transit to Wellington. We arrived in Wellington on 22 March at 08:30.



Arrival in Wellington. Photo: Sebastian Krastel

We can already say that the SO310 expedition has been very successful. We have collected a large dataset of hydroacoustic and seismic data of excellent quality. We have taken cores at 36 locations with a core total recovery of 149 m. We deployed and recovered Ocean Bottom Seismometers at 31 locations. We thus have all the data in hand to analyze the role of mass wasting in the two contrasting canyon systems.

RV Sonne has been an excellent platform for our work. We would like to thank Captain Birnbaum and the entire crew for their great support and the very good working atmosphere on board. We all enjoyed our time on the RV Sonne very much and will be very happy to

come back! We would also like to thank our New Zealand colleagues from NIWA and GNS, without whom this expedition would not have been possible.

With best wishes on behalf of all participants

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Wellington



Group photo of the SO310 scientific team. Photo: Anke Dannowski