

FS Sonne
Cruise SO310 (S-555)

20.02.25 – 22.03.25, Wellington – Wellington

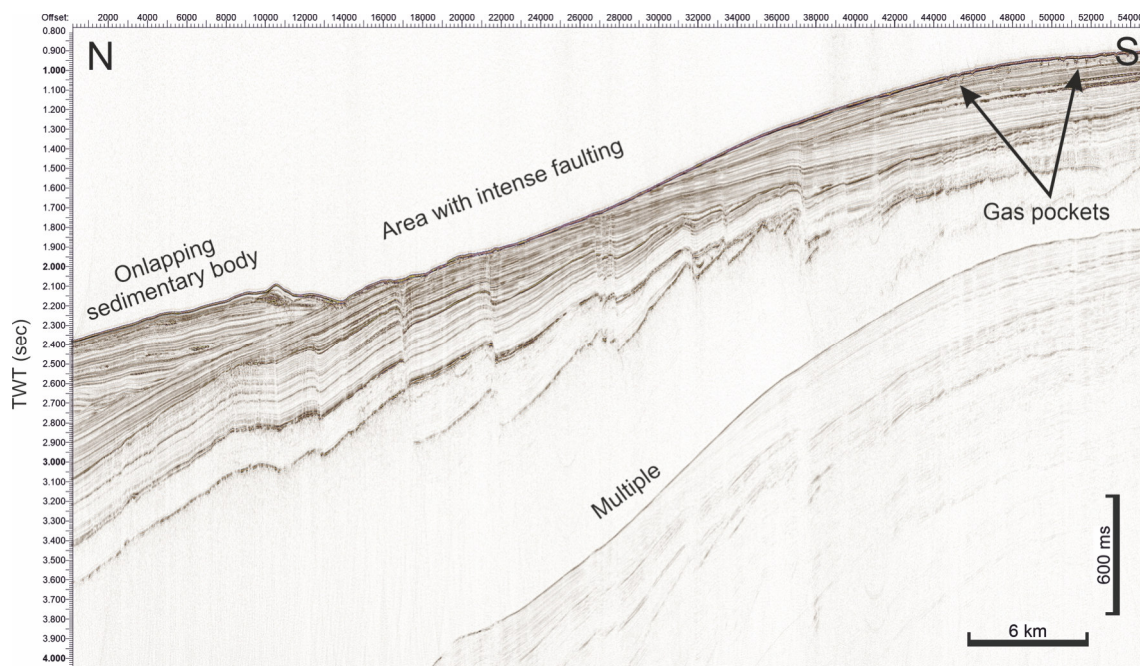
Weekly Report No. 4, 10.03. – 16.03.2025

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



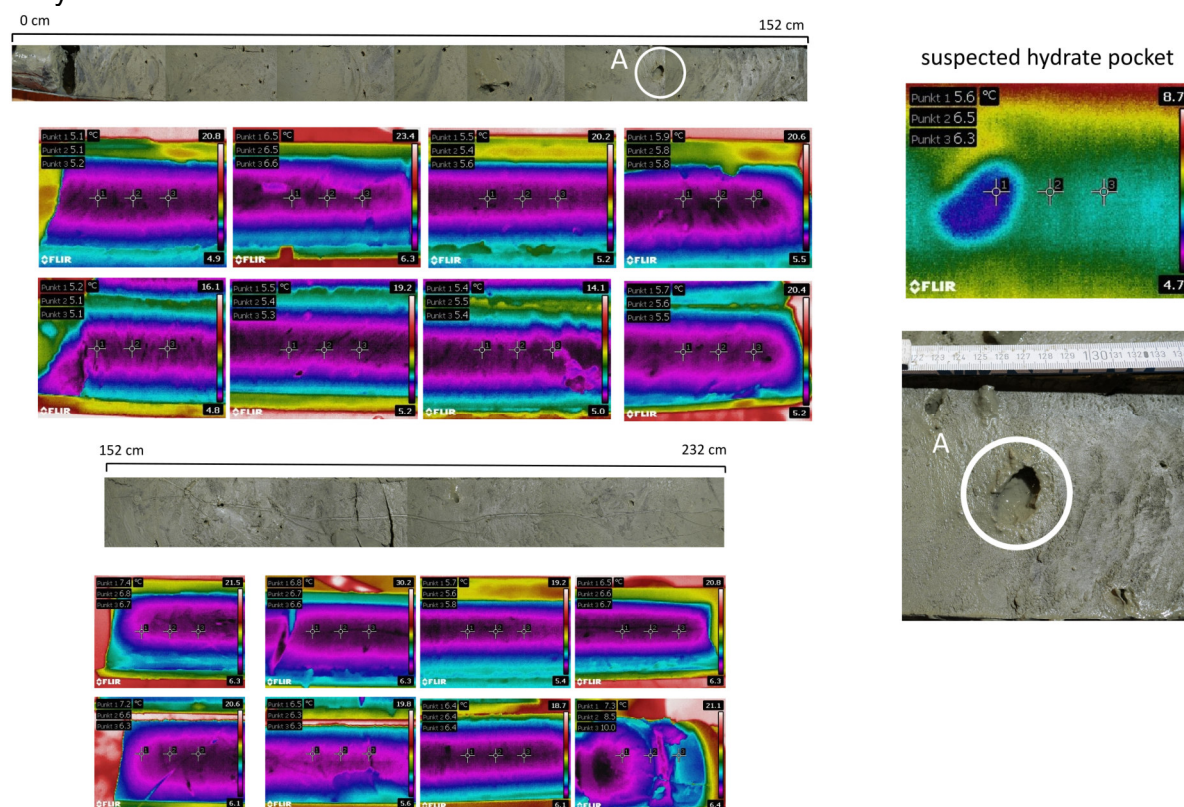
4. Weekly Report

The giant box cores collected across Palliser Canyon at the end of last week clearly show that the entire canyon floor is free of young sedimentary deposits, suggesting that this canyon is a very active system with ongoing sediment transport. During the night of 10 March, we collected a dense network of Parasound profiles across several landslide scarps on the edge of the Palliser Bank. The P-Cable was deployed again on the morning of 10 March, but another failure occurred after full deployment and the cable was retrieved. Due to the forecast of bad weather in the Palliser Canyon area over the next few days, we made the short transit to the Pegasus area to continue our 2D seismic imaging of this area. The streamer was fully deployed at 18:00 on 10 March. The focus of this survey was to acquire tie lines between cross profiles and some additional cross profiles based on the results of the previous survey. An example of a line running parallel to the canyon system is shown below. The most prominent feature is a series of normal faults. These faults continue into Pegasus Canyon, influencing the evolution of the canyon. The data also show a close interaction between erosional and depositional processes and small shallow gas pockets. The seismic survey was continued until 06:00 on 12 March.



Seismic profile parallel to the Pegasus Canyon System

Two cores were taken in the early hours of the same day, targeting the canyon thalweg and the drape over a large landslide deposit. Coring was then suspended due to stormy weather conditions. Coring resumed at 08:00 on 13 March. On this day we successfully sampled a total of 5 gravity core and 2 giant box core stations in different areas of the canyon system. This included a repetition of a station from the previous day. This station is located on the canyon's thalweg, next to a large failure in the canyon wall. The previous day's core contained open holes and linear structures down to 5 m sediment depth that were difficult to explain. We speculated that they might be formed by hydrates that dissociate when the cores are at the surface. We therefore prepared a liner that could be opened immediately after core recovery in order to measure the temperature around the open holes. If there have been gas hydrates, they should leave a temperature anomaly, even if they are already completely dissociated. The areas around the holes are at least 1 °C colder than the surrounding sediments. The holes also contained water, which remains behind when gas hydrates dissociate. We interpreted this as an indication of probably very small pieces of dissociating hydrate, although definitive evidence is lacking and we do not have the tools on board to conclusively test for the presence of hydrate. However, we have also identified Bottom Simulating Reflectors (BSRs) on some of our seismic lines that clearly indicate the presence of hydrates in the area.



Images of core SO310_58, which was opened immediately after recovery. The core contains clayey silt and a high organic content. The coloured images are infrared scans of the opened core sections. The general trend shows a warming of the core from the outside, but there are also areas with colder temperatures. The image on the right is a zoom of one of the holes. The temperature in this hole is at least one degree colder than the surrounding sediments.

After a very successful day of coring, we returned to the Palliser area where we arrived on the morning of 14 March. We deployed the P-Cable and started collecting data. Despite a successful and promising start, by late afternoon we were experiencing problems and were losing records from individual streamer sections, indicating a problem with the data cable under tension. The P-Cable was recovered and we then collected a number of profiles for the OBS that were still on the seafloor. In the evening, we had the chance to watch a full lunar eclipse.



Full lunar eclipse observed during Sonne-Cruise SO310 on 14 March (Photo: Lukas Driesch)

Four stations across a landslide scarp were sampled on 15 March; two cores from the transect were duplicated to recover whole round core samples for geotechnical testing after the cruise. Additional profiles for the OBS were collected during the night. We started to recover the OBS at 06:30 on 16 March. The release of all OBS went smoothly and all OBS were on board by early evening. We are currently collecting three final cores in the Palliser region before moving to the Pegasus region, as very strong winds are forecast in the Palliser region for the next week. We hope to be back in the Palliser region by the middle of this week to finish some profiles before arriving in Wellington on Saturday 22nd March.

With best wishes on behalf of all participants

Sebastian Krastel
(Christian-Albrechts-Universität zu Kiel)
Auf See, 41°45.5'S, 175°11.3'E