



## Research Vessel SONNE Cruise SO312

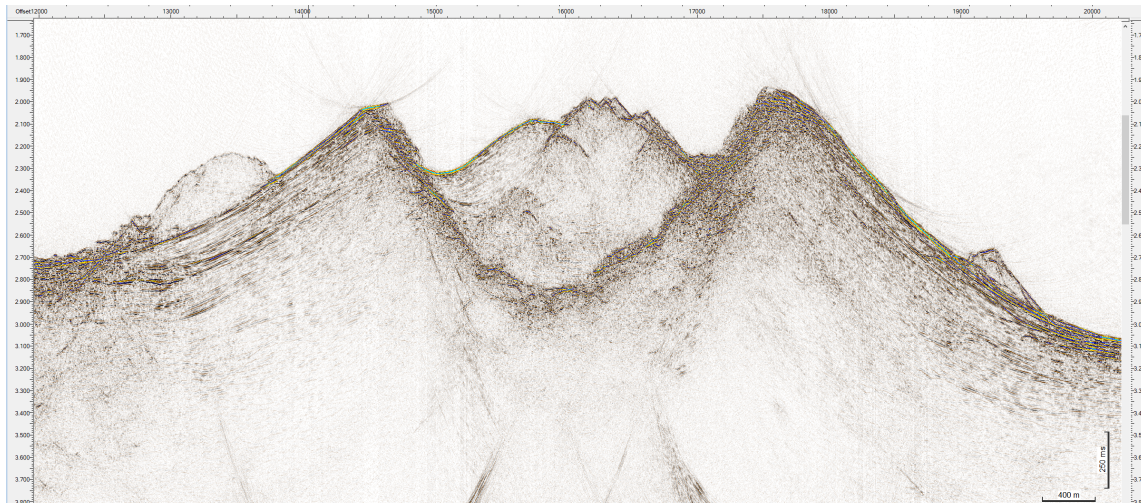
### 2<sup>nd</sup> Weekly Report (12. - 18.05.2025)

The second week of SO312 was characterized by more seismic acquisition at Brothers Volcano. The strong winds at the start of the week gave way to several days of good weather in the center of a high-pressure system.

The 2D seismic survey at Rumble III volcano lasted until Sunday 11.5. at 1900. We then retrieved the seismic equipment and sailed north towards the eastern flank of the rift basin east of Brothers Volcano. On this passage we deliberately left the exclusive economic zone of New Zealand to comply with the immigration regulations. We surveyed the area east of Brothers Volcano with multibeam mapping and the towed magnetometer tows until Tuesday, 13.5., morning at 0145 when the weather had sufficiently calmed down to begin with P-Cable operations. By 0900 we started to deploy the P-Cable system south of Healy Volcano and acquisition was underway by 1500.



Figure 1: Seismic source deployment. Photograph: Ines Staben.



*Figure 2 2D seismic line through Brothers Volcano showing the stratified dacitic edifice and the young volcanic cones within the caldera. The strong seismic amplitude reflectors underneath the cones arise from the caldera floor.*

Wednesday morning, we had to retrieve the portside paravane to repair the data cable. Acquisition resumed at lunch time. 3D seismic acquisition then continued until Thursday May 15 when at noon the first dyneema line of the cross cable broke. The resulting tension on the data cable caused additional electrical damage in the data cable and the whole system had to be recovered.

To make use of the good weather we deployed the 2D seismic system again, but this time with four G-Source and a 75 m-long active section in order to achieve greater penetration and collect data across the deployed OBS. These data turned out spectacularly well providing higher penetration at almost the same resolution as the GI source. The next 30 hours until Friday were used to repair the damage to the data cable and reassemble and test the 3D seismic acquisition system. At 1300 on Friday, May 16, we recovered the 2D seismic system and by 1800 P-Cable acquisition resumed after the marine mammal observers had given their all clear.

A preliminary analysis of the 2D seismic data shows that we are able to image at least the top 1000 m below Brothers Volcano and give a first glimpse of the structure of the volcano and its caldera showing the caldera floor below the new volcanic cones and that it will be possible to integrate them with IODP drilling results to develop a better understanding of the hydrothermal systems at Brothers Volcano. The 2D seismic also demonstrate the need for 3D data as the steep topography causes strong side reflections that affect the imaging of the shallow subsurface. We therefore hope that the weather conditions stay suitable for completing the 3D seismic cube which is now (Sunday evening) about 50% finished.

All on board are well and look forward to the next week of the expedition.

On behalf of all cruise participants,

Christian Berndt  
(Chief Scientist)