3rd Weekly Report M186
12 - 18 December 2022

In our third week, unsettled, very stormy weather continues to be our biggest challenge. Storms pass over the Azores every few days, interrupted only by brief intervening better periods. In the night from Friday to Saturday, wind speeds of around 150 km/h (hurricane force) were measured at the peak. Despite these circumstances, however, we can continue our work in protecting the islands of Sao Jorge, Pico and Faial quite successfully. During the intermediate highs, we were also able to leave this protection, at least for a short time, for work outside the Sao Jorge Channel.

The Sao Jorge Channel is also one of the main work areas that was firmly scheduled for the trip, so we did not have to completely change our destinations due to the weather restrictions. The slightly longer stay in this region allowed for very detailed sampling and surveying of this very interesting and seismically active area. There was last elevated seismic activity in the southwest of Sao Jorge Island in March 2022.

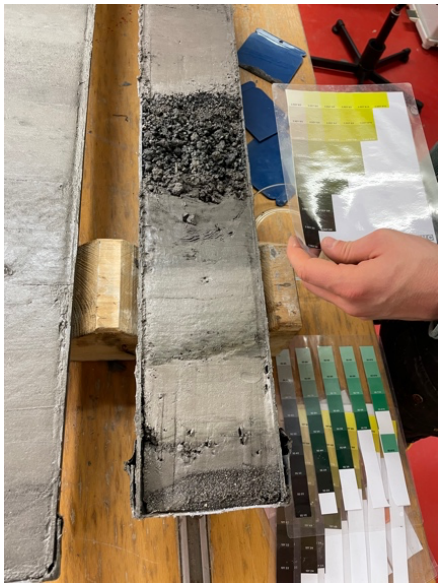
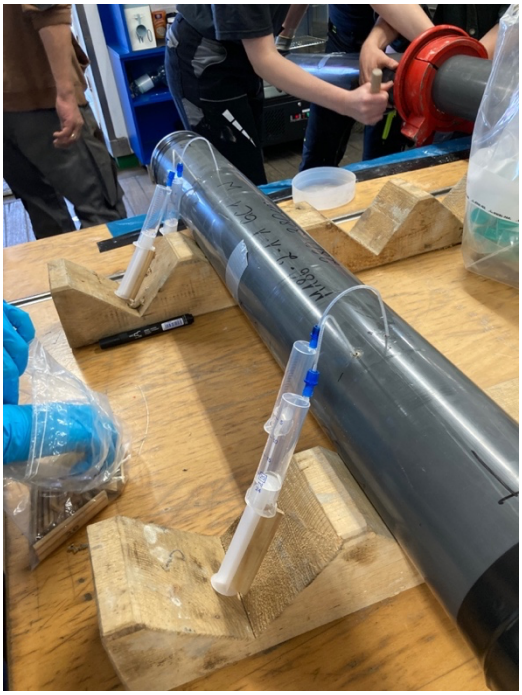


Fig. 1 Ash and lapilli layers in a sediment core Photo by Sophia Ramalho.

The first three days of the week we had to stay in the Sao Jorge Channel, deploying twelve gravity cores and eight multicorers and three deployments of the heat flow probe, within small intervals in the channel. It is particularly exciting because we find a high variability in the upwelling fluids here in a very small area. The gravity cores further provide a detailed archive of ash and lapilli layers that attest to volcanic activity, as well as landslide events in the region (Fig. 1). Some of the ash and lapilli layers can already be well correlated visually between the cores. It is noticeable that there have been some events in the past whose deposits are found

very extensively throughout the channel, whereas others occur only very locally. Further geochemical and petrographic analyses on land will provide information about the origin of the deposits, the depositional processes and their distribution.

On Thursday, with the best weather and beautiful views of Pico, we were finally able to leave the protection of the island and take samples at a presumed sill. A sill is a magmatic intrusion into a sediment at the edges of which fluids can rise.



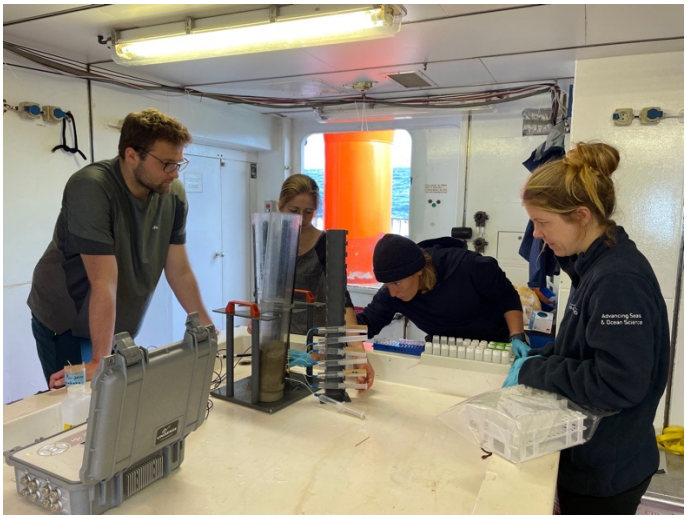


Fig.2 Left: Rhizone sampling of a sediment cores, photo: Sofia Ramalho
Right: Rhizone sampling of a MUC core, photo: Johanna Schenk

The Location of the sill in the sediment we have been able to estimate very well using seismic lines. Based on these data we planned the core positions and also the profiles for the nightly heat flux measurements. Results of pore water geochemistry, heat flux measurements, and seismic coincide very well at the Sill. The pore water chemistry of the sediments provides insight into the potential influence of hydrothermal fluids. To extract the pore water from the sediment, rhizones are inserted into pre-drilled holes in the still closed sediment core (Fig. 2).

We had to spend the weekend again in the shelter of the island. Due to the strong hurricane only the use of the OFOS was possible here. During two dives we were able to take nice pictures of the Pillow Basalt at a volcanic cone as well as of the fauna, which mainly consists of sponges and corals.

With best regards in the name of all participants
Christopher Schmidt
(GEOMAR Helmholtz Centre for Ocean Research Kiel)