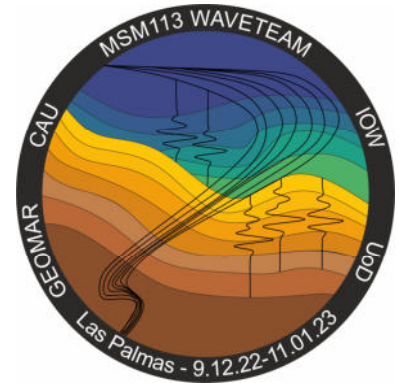


RV MARIA S. MERIAN

Cruise MSM113 (GPF 21-1/032 and 22-2/024)

09.12.22. – 12.01.23, Las Palmas – Las Palmas



Sediment wave generation in continental margins (WAVETEAM)

Structure of the submerged mobile western flank of Cumbre Vieja Volcano, La Palma (Sub:Palma)

4th Weekly Report (26.12.2022 - 01.01.2023)

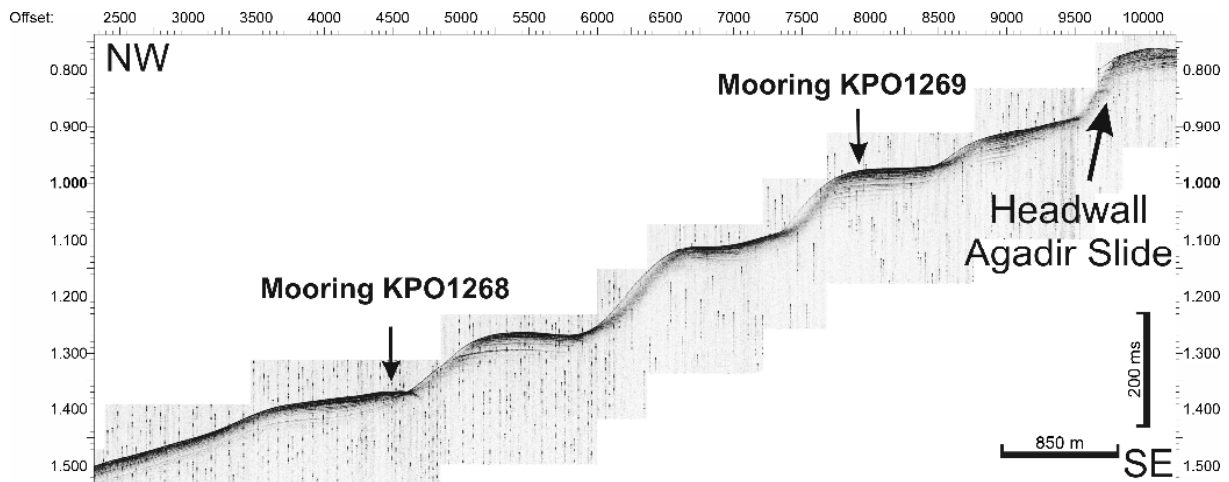
After completing our activities in our first working area off Cap Bojador south of the Canary Islands, we have been north of the Canary Islands in the area of the Agadir Slide and Agadir Canyon since the evening of Christmas Day. Sediment waves are widespread on the continental slope in this area. They are mainly located in water depths between 500 and 1200 m. The sediment waves in the region off Agadir are very regular compared to the sediment waves in the region around Cap Bojador. In addition, there are a number of small and large canyons through which sediment is transported from the shelf to the deep sea.

We had originally planned to deploy the moorings again on December 26. However, slightly more wind was predicted for that day, so we used the day for hydroacoustic surveying. We surveyed the area around the mooring locations with the EM712 multibeam to capture the bathymetry in great detail and map the internal waves in this area at the same time. This helped to select the final mooring locations. Additional hydroacoustic data were recorded southwest of the planned mooring locations.

December 27 was a very busy day. Hydroacoustics continued until 07:00h. Some profiles had to be adjusted due to fishing activities. Subsequently, a CTD was run at both planned mooring locations, and sediment samples were collected with the gravity and giant box corers. Both moorings are located below the headwall of the Agadir slide. One mooring is located at the downslope boundary of the sediment waves. The second mooring is located two waves further upslope. The deployment of the moorings proceeded without any problems in now again best weather conditions; at 17:00h both moorings were in the water.



Deployment of mooring.



Parasound profile across the mooring stations in the 2nd working area offshore Agadir. The profile images regular uniform sediment waves.

We started a seismic survey at 18:00h. We only start seismic surveys during daylight hours because we look for marine mammals for an hour before we start the survey and during the soft start to ensure that no marine mammals are too close to the vessel during the survey. The objective of this seismic survey was to tie in existing seismic lines around the headwall area of the Agadir slide to DSDP-site 415. This well is located immediately south of Agadir Canyon approximately 100 nautical miles north of the moorings. The seismic survey was interrupted for a short time because a streamer segment failed, but was quickly resumed after the faulty segment was identified. The survey continued until 07:00h on December 29. The planned profile had to be changed slightly at the end of the survey after passing the DSDP-site, as longlines were laid out across our profile by a fisherman. Intensive fishing activities are common in this area, so we have to adjust our planned profile nets very frequently. The structures we are studying on the seafloor, such as morphological steps, are areas that are particularly promising for fishing.

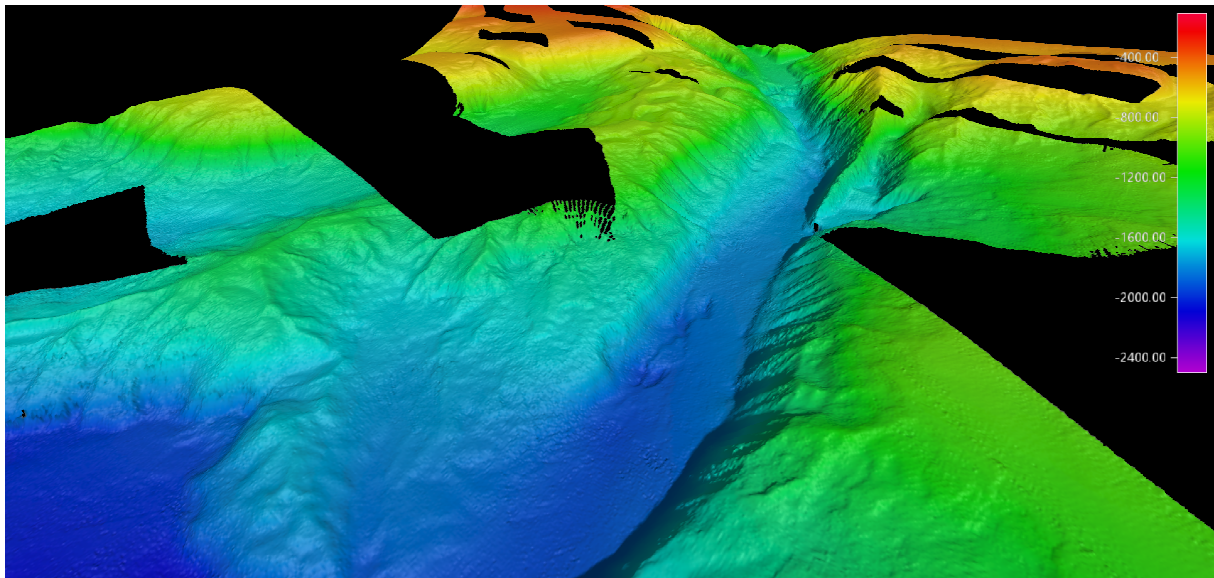
MSM113-55-01: On top of Trimline



Core in the area of Agadir Canyon. The 682 cm long core contains various turbidites with an erosive base (darker layers) and a debrite at the base (right segment) of the core.

We took cores on the walls of Agadir Canyon on December 29. The objective was to sample turbidites to estimate the frequency and size of turbidity currents passing through the canyon. Agadir Canyon is one of the main source areas for the very large turbidite deposits of the Moroccan turbidite system at the mouth of the canyon. We chose to core at a morphological step in an area where the Agadir slide enters Agadir Canyon. Core locations were above and below the morphological step. Both cores contain a large number of turbidites. Distinct differences in the cores will aid in characterizing the flow behavior of turbidity currents through Agadir Canyon.

The night was used to map potential sampling locations in the upper Agadir Canyon area by means of hydroacoustic methods. This region is believed to be the source area for very large turbidites of the Moroccan turbidite system, but no obvious collapse structures are visible in the head region of Agadir Canyon. We assume that the turbidites initiate as small events and then erode much material on their way downslope, which is incorporated into the turbidity current. We wanted to take samples at several locations to narrow down the area of origin of individual large turbidites. Plenty fishermen were around in our survey area, and we had to keep adjusting profiles. When we approached the first selected coring location in the morning of December 30, it quickly became clear that the position was inaccessible due to longlines that had been laid out. Therefore, we started taking cores further north. In total, we recovered four cores on terraces above the canyon. All cores are long (>8m) and contain mainly undisturbed background material. The last core, taken at the site that was not accessible in the morning, contained two turbidites that we can correlate with turbidites of the Moroccan turbidite system based on initial assessment. Coring at Agadir Canyon was completed by late evening on December 30. We then began another hydroacoustic survey. We followed Agadir Canyon to a point where a prominent secondary canyon joins the main canyon. We surveyed this secondary canyon uphill to document morphological changes compared to a survey conducted during cruise MSM32 in 2013. Additional surveys were conducted on the shelf edge in the Agadir Canyon area. The morphology of the canyon head is even more complex than expected.



Perspective image of Agadir Canyon morphology on the upper continental slope.

At the turn of the year we acquired a profile only about 15 nautical miles from the Moroccan coast. We spent the evening together with barbecue, a pub quiz, chocolate fondue and 'Berliners' (type of doughnut) on deck. The galley crew again did an incredible job. Since this morning we are on our way back to the moorings. There we will deploy seismic for further surveys this afternoon.

Everyone on board continues to be well and the great weather is adding to the good mood.
With best wishes for the new year, and greetings on behalf of all cruise participants

Sebastian Krastel

(Christian-Albrechts-Universität zu Kiel)

At sea, 29°25'N, 011°47'W