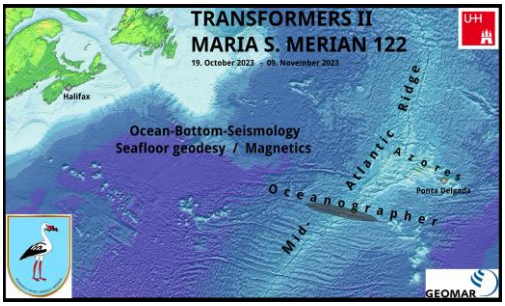
MARIA S. MERIAN 122



Ponta Delgada – Halifax
19. Oktober bis 9. November 2023

2. Weekly Report (23.10.- 29.10.2023)

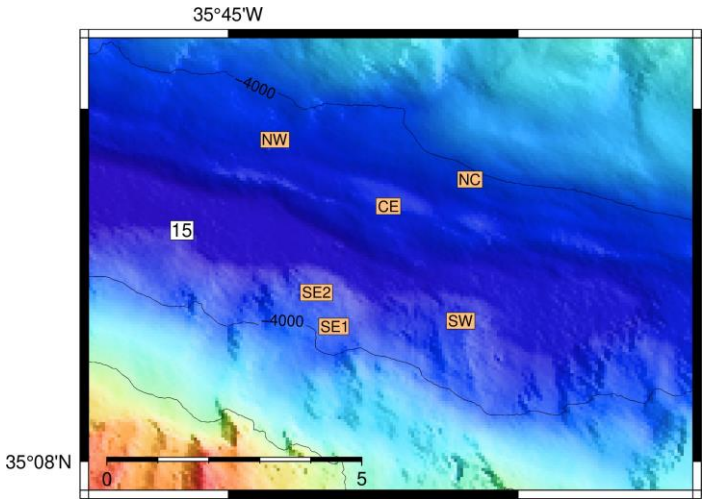
In the second week of the expedition MSM122 the research activity was focused on the installation of a seafloor geodetic network across the Oceanographer transform fault. The geodetic data are complementary to seismological observations. Thus, the ocean-bottom-seismometers deployed during the first week register the onset time of seismic waves emitted from micro-earthquakes

Seafloor geodesy station on deck of RV MARIA S. MERIAN

occurring below the network. Micro-earthquakes are a treasure trove for seismologists, revealing both the geographical location and focal depth of event, which, in turn, can be used to survey tectonic processes and physical parameters of the crust (temperature, seismic velocity, etc.). Seismic activity highlights the tectonically active fault trace where stress cause earthquakes. However, tectonic stresses at plate boundaries such as transform faults accumulate over days, weeks and years, but the accumulated energy is either released spontaneously during an earthquake or gradually and even continuously, showing creep. A slowly moving fault is not prone to cause any earthquakes. Consequently, OBS may fail to record earthquakes, but aseismic fault motion and hence displacement should be picked-up using seafloor geodesy measuring changing distances between a communicating network.

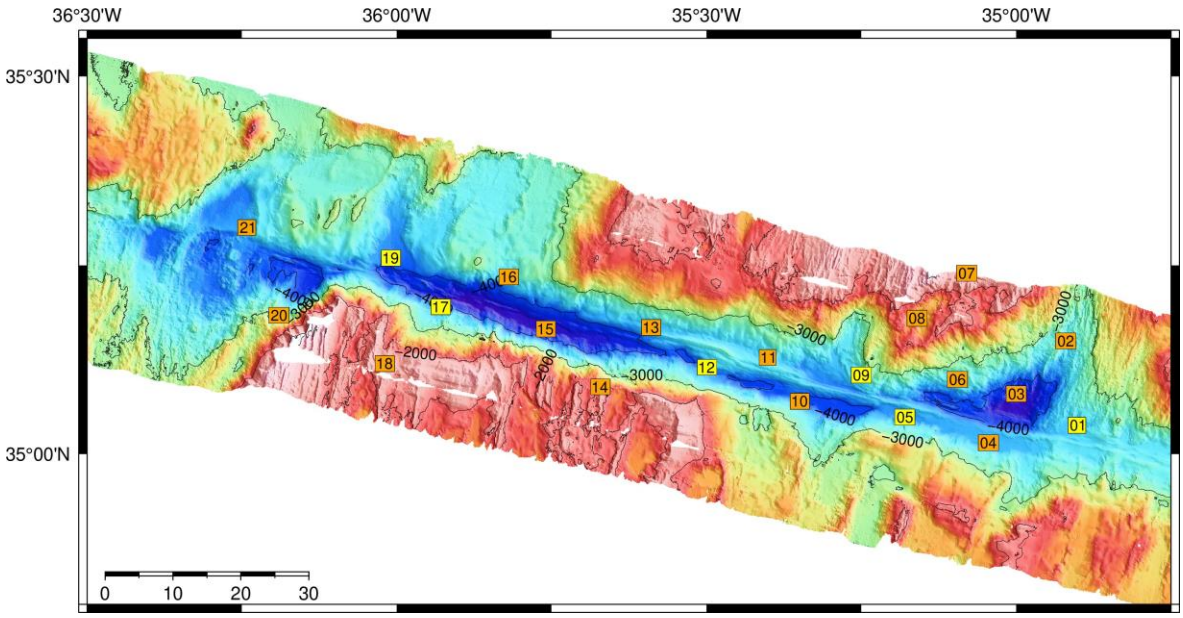
Ocean-bottom-seismometers record continuously and autonomously seismic signals on the seabed. In contrast, seafloor geodetic stations have to “see” each other and communicate with each other. Therefore, the deployment process requires much more “care”. Thus, geodetic stations were lowered carefully to the seabed using the deep-sea winch of the research vessel. Reaching the seafloor, we first establish that communication among the different stations was given. Thereafter, stations were released and left on the seafloor. In total, we spent much of the hours with daylight between Monday and Wednesday to place six seafloor geodetic stations facing along and across the

active fault trace as defined in high-resolution swath-bathymetry. During the night hour and after installing the network, we mapped the magnetic field over the Oceanographer transform in high spatial resolution.



Location map of seafloor geodetic station on the seabed

In addition to the outlined measurements, we had planned to obtain high-resolution video footage of the seafloor geology. However, during the video-controlled OBS deployment in the first week we recognized that the light provide by the lander was not enough for studying geology in detail. Therefore, we postpone this programme and decided to obtain additional magnetic field data instead. Currently, MARIA S. MERIAN is sailing southwards to study the dynamics of the Hayes transform fault by the means of magnetics and swath-mapping.



Location map of ocean-bottom-seismometers installed along the Oceanographer transform

In the name of all cruise participants, best regards from 34°50'N / 38°55'W,

Ingo Grevemeyer
GEOMAR Helmholtz Centre for Ocean Research Kiel