RV Maria S. Merian
Cruise MSM103 (GPF 20-2-046)
12.09. – 15.11.21, Emden – Emden

PRINCE
Groundwater resources offshore Prince Edward Island, Canada

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In the first half of last week (October 4th - 7th) we carried out our first successful CSEM (controlled source electromagnetic) measurements. After our bottom-towed system was damaged during a first attempt in the previous week (see last weekly report), this time we used our transmitter in the "CAGEM" configuration (see Fig. 1). In this configuration the pressure tubes with the transmitter electronics are mounted in a small frame above the actual transmitter antenna. The antenna itself consists of a 6.3m x 6.3m frame with metal grates attached to each corner, which serve as transmitter electrodes. Diagonally opposite transmitter electrodes are used as dipoles, so with this arrangement it is possible to carry out measurements with two horizontal dipoles that are perpendicular to one another. The transmitted signals are recorded with the previously deployed stationary OBEM receivers. Compared to the bottom-towed system the dipole moment that can be generated - i.e. the transmitter strength - is considerably smaller due to the much smaller antenna (bottom-towed: 100m, CAGEM: 9m). Still, the CAGEM system thus has a maximum penetration depth of around 500m which is more than sufficient for the research questions to be investigated in the scope of our project. Due to the size of the working deck of the Merian and the flexibility of the jib-beam, the CAGEM system can be deployed and withdrawn within a few minutes after assembly.

Fig. 1: CSEM transmitter in "CAGEM" configuration.

(Foto: Bruna Pandolpho)

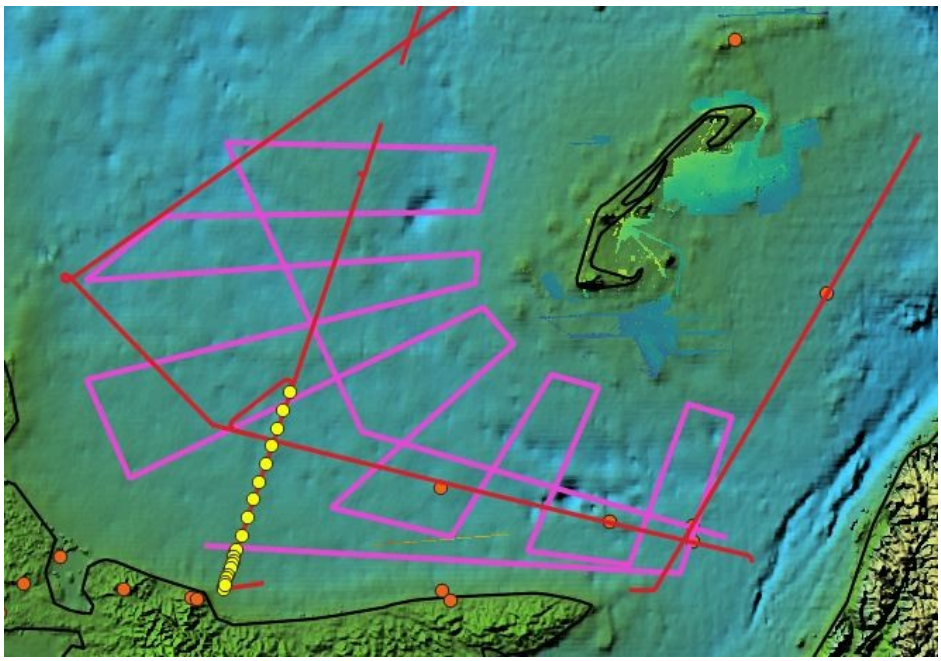

Fig. 2: Overview map with the location of boreholes (orange), the positions of the OBEMs (yellow), the completed seismic profiles over the boreholes (red) and the current seismic profiles (magenta).

During the first run with the CAGEM system, we measured along the northern 40km of the OBEM profile that was laid out two weeks ago (yellow dots in Fig. 2). Due to the large station spacing of 5 km between the OBEM stations – originally set up to be used with the bottom-towed system – we will not have overlapping coverage of adjacent stations, but will rather collect selective information in the vicinity of each OBEM station in this section of the main profile, which is due to the limited source strength. In the following, we collected the northern OBEM stations in order to then redeploy them in the southern part of the main profile with a denser station spacing of approx. 900m. Here, we were then able to measure along a denser profile of 12 km in length. After the subsequent successful recovery of all OBEM stations, we completed this busy first part of the week with EM measurements on Thursday at noon.

Since then, with short interruptions, we have started profiling with seismics along profiles with a total length of approx. 1200km (magenta line in Fig. 2), which cover the area between Prince Edward Island in the south and the Îles de la Madeleine (IdM) in the northeast. The profiles are pointing towards the IdM, as a subsidence area around the island indicates a circular strike direction. Of particular interest to us are subsidence areas in the eastern part of the profiles, as we could potentially expect leakage of groundwater here. The completion of the measurements is planned for the middle of next week.

With best regards on behalf of the crew of cruise MSM103

Sebastian Hölz
(GEOMAR – Helmholtz Centre for Ocean Research Kiel)