

## POS524 – GrimseyEM – Grimsey Vent Field, Iceland – 25.6.2018

### 2. Weekly Report

After we were forced to leave the survey area on the 15. - 16.6 to seek shelter in the nearby Eyjafordhur fiord, we were able to continue with the scientific work plan on the 16.- 17.06. After returning to the area of interest, a further gravity core was taken, several stations were measured using the heat probe and 3 OBEM receivers were intended to be redeployed along a longer east-west transect. Unfortunately, one receiver (RX11) did not resurface and we were forced to temporarily abandon the station to continue on with a new transmitter configuration using the MARTEMIS system, which allows us to increase the depth of investigation. Measurements were obtained along an approximately 4 km long profile. During the measurements, winds and waves returned and we were again forced to leave the measurement area to seek shelter in the nearby fiord.

After returning to the survey area on 19.06 further measurements were conducted using the heat probe. In the following days, MARTEMIS measurements were conducted along 20 km profile and two further gravity cores were retained. Subsequently, the remaining 11 OBEM stations were successfully retrieved and the exciting search for the lost system began. Surprisingly, the triangulation indicated that the station had moved approximately 1.5 km from its original position. The next morning, we redeployed the MARTEMIS transmitter cage with an attached camera system to search for the lost receiver. After less than an hour of searching, we found the station near the position that was indicated by the triangulation. Due to the large distance from the deployment point and the fact that the station is currently upside-down, we infer that it must have been caught in a net. Unfortunately, we were unable to retrieve the station due to insufficient material on deck. However, we hope to retrieve the station in our 2019 campaign.



Fig. 1: Station RX11 on video (top left) and ropes holding rescue hooks in the foreground.

A first interpretation of the acquired CTD data, which was attached to the MARTEMIS system during measurements shows significant anomalies in temperature and salinity in the unsuspected regions of the survey area. However, a comparison to the CTD data of several OBEM receivers shows that these fluctuations are not decisive indicators for hydrothermal activity, but rather temporary fluctuations in the regional temperature field. These variations are on the order of  $1.0^{\circ}\text{C} / 24\text{h}$  which means that CTD data without an adequate regional drift correction are insufficient to detect hydrothermal activity in the area.

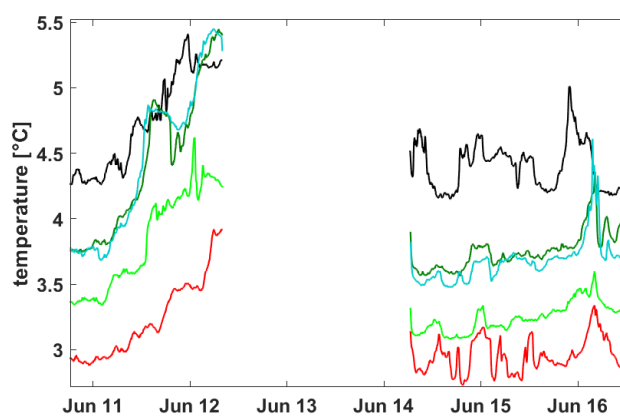


Fig. 2: Temperature measured at several stationary OBEM receivers.

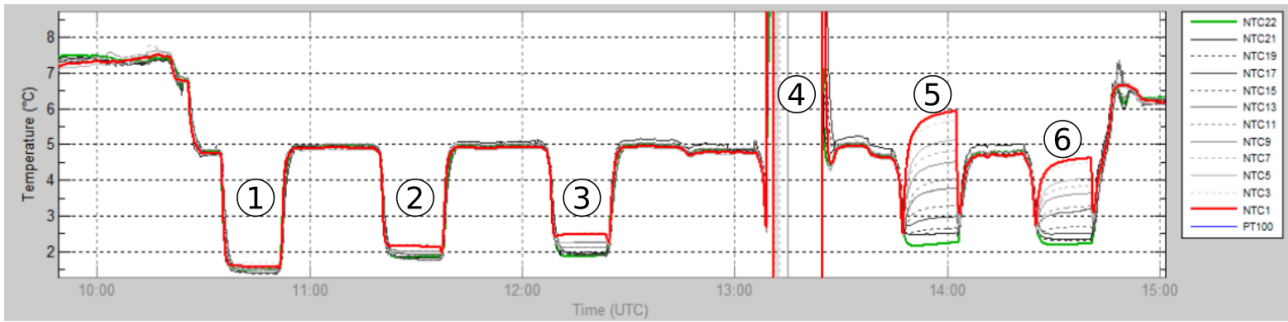


Fig. 3: Profile with six measurements with the heatflow probe (West ↔ East). Stations 1-3 and stations 4 – 6 are located to the East and West, respectively, of the hydrothermal field.

A heat probe measurement along one profile shows temperatures of ca. 5°C if the probe is located 150m above the seafloor. Along the seafloor, the temperature decreases to approximately 1.5°C.

To the east of the known hydrothermal field, background temperatures are measurable within the sediment and a slight increase of temperature is observable at closer distances to the field. Station 4, which is located ca. 350m east of the field centre shows a significant temperature increase above 70°C that we were unable to resolve with the sensors of the heat probe. Previous measurements had only experienced temperatures of 10 – 20°C within the sedimentary cores. In comparison, temperature values of 35°C were measured during this cruise which indicates that the hydrothermal field is currently in a more active phase than before.

On a final note, we would like to show preliminary results of the data measured with the MARTEMIS system. Transients measured above the hydrothermal field (red) show significantly larger voltages compared to the background (black) curves acquired at large distances to the hydrothermal field. Additionally, compared to previous measurements, the curves are now free of distortions that were previously caused by small metal components within the measurement system that have now been removed. Here we would like to acknowledge the cooperation with the TLZ (special thanks to Marion Deckelnick and Florian Beeck ...). Further results will be presented in the cruise report and in the GDY seminar this Fall.

Crew, technicians and scientists are all well and excited to return to Kiel to enjoy temperatures above the typical 5°C, which accompanied us throughout our time at sea.

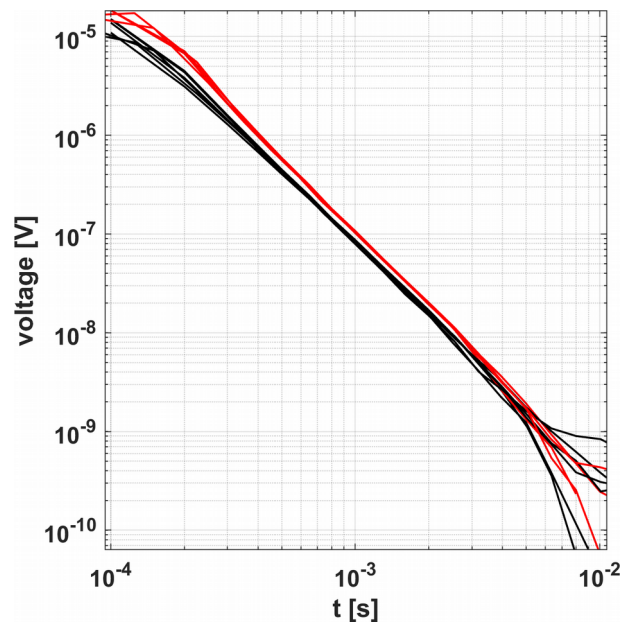


Fig. 4: Processed transients measured with the MARTEMIS system above and away from the hydrothermal field (red and black, respectively).