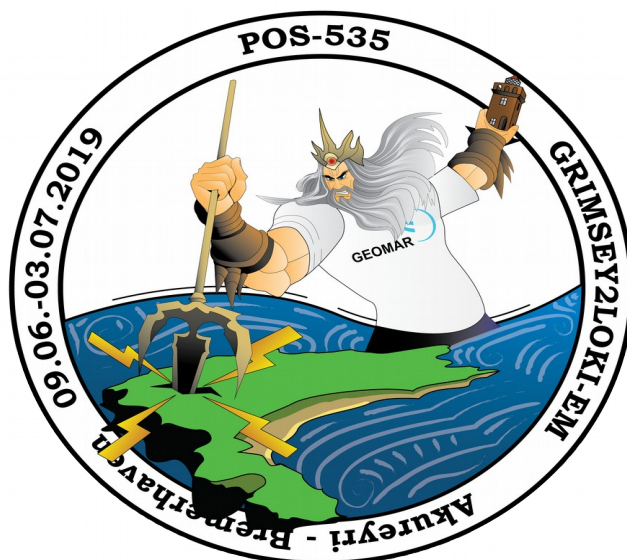


POS535 – Loki2GrimseyEM – Grimsey Vent Field, Iceland – 17.6.2019

1st Weekly Report

In the framework of cruise POS535 (“Grimsey2LokiEM”), we aim to conduct transient electromagnetic and heat flow (2.2 m sensor length) measurements combined with gravity coring (2.8 m length) to study hydrothermal fields located along the arctic section of the Mid-Atlantic Ridge. Conductive resistivity anomalies found within the marine environment can not only be used to detect fault structures, but also regions of hot saline fluids occupying the pore space of the seafloor sediment. We use the MARTEMIS coil system and our newest member of the EM fleet (CAGEM), which transmits dual polarization galvanic fields, in combination with stationary, seafloor-based OBEM receivers to detect anomalous regions within the seafloor. The interpretation of the EM data is supported by further geophysical measurements (heat flow and CTD data) and geological (gravity coring) data.



We are currently onboard the RV Poseidon located north of Iceland within sight of the main Island, in the direct vicinity of the island Grimsey. As we are currently waiting for the gyrocompass to be fixed, we have sufficient time to summarize the first phase of our research cruise.

Since the RV Poseidon had a transit from Bremerhaven to Akureyri (Iceland), we were able to mobilize, set up and configure equipment (installation of Posidonia system, set up labs, etc.) on May 30th in Bremerhaven before the vessel departed. In Akureyri, an international team of 9 scientists from five nations (Germany, Iran, Canada, Colombia and Portugal) boarded the vessel on June 8th. On the following morning we departed from Akureyri and reached our survey area on that evening. After short preparation, we were able to begin our research at the Grimsey Vent Field. On the following days, (10.06 -15.06) we conducted the following tasks....

- Installation of twelve free-falling OBEMs around the hydrothermal field
- 15 heat flow measurements throughout the survey area
- five gravity cores with a total recovery of approximately 10 m at pre-defined positions within the Grimsey Vent field
- Profile measurements over top the OBEM configuration using the MARTEMIS coil system with a total length of ca. 20 km
- Measurements with the new CAGEM system along profiles with a total length of approximately 12 km.

After the EM experiments, we spent the last two days successfully recovering all 12 OBEMs. Today we were able to take two further gravity cores (total length of 140 cm) in a second survey area called Öxarfjörður located ca. 25 nm south-east of Grimsey. This area was suggested by the colleagues from the Icelandic Geological Survey (ISOR) as a possible hydrothermal field and is therefore relevant for our studies.

We are currently securing the measured EM data. A first look into the heat flow measurements has not confirmed any further “hot” regions. However, an interesting discovery was made at one measurement point that was re-surveyed from last years cruise (POS524). In the course of 1 year, the temperature has dropped from 16°C @ 3 m in 2018 to 7°C @ 3 m in 2019, which may suggest temporary fluctuations of hydrothermal activity within the vent field. We hope to derive further evidence of these fluctuations using the measured EM data.

Tomorrow we commence our journey further north. Stay tuned for our next weekly report that will hopefully reach interested readers from Loki’s Castle hydrothermal field.

All members of the team and cruise participants are feeling great and are enthusiastic to discover the hidden secrets of Loki’s Castle.

Until then,

Sebastian Hölz

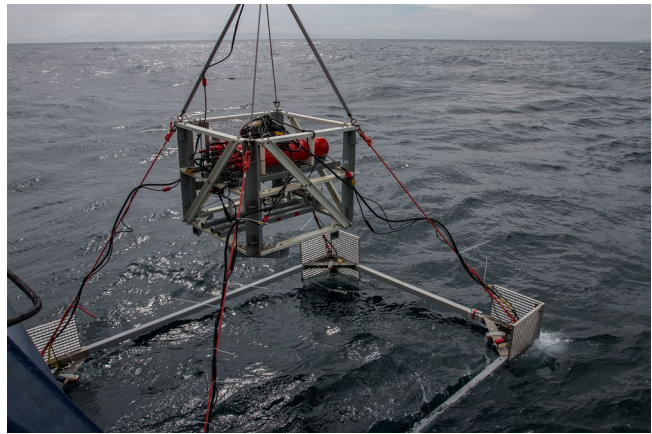


Fig. 1: Deployment of CSEM transmitters (top) and antenna frame with two crossed dipoles (bottom).