

# NOTIFICATION OF PROPOSED RESEARCH CRUISE

## PART A – GENERAL

**1. Name of Ship**

FS Poseidon, Cruise No. POS535

**2. Dates of Cruise**

9.6.2019 (Akureyri, Iceland) – 3.7.2019 (Bremerhaven, Germany)

**3. Operating Authority**

GEOMAR - Helmholtz-Zentrum für Ozeanforschung Kiel

Wischhofstraße 1-3

24148 Kiel

Germany

Telephone +49 431 600 2132

Telefax +49 431 600 1601

E-Mail klackschewitz@geomar.de

**4. Owner**

(if different from para 3)

See above.

**5. Particulars of Ship**

|                 |                                     |
|-----------------|-------------------------------------|
| Name            | FS POSEIDON                         |
| Nationality     | German                              |
| Overall length  | 60,80 meters                        |
| Maximal draught | 4,90 meters                         |
| GRT             | 1105 GRT                            |
| Propulsion      | Diesel Electric                     |
| Call Sign       | DBKV                                |
| IMO no.         | 7427518                             |
| MMSI no.        | 211204360                           |
| Telephone       | Vsat +49 421 9440243011             |
| E-Mail          | bruecke@poseidon.briese-research.de |

**6. Crew**

Name of master Matthias Günther

Number of crew 15

## 7. Name & Address of Scientist in Charge

Name and address of Scientists in charge

Dr. Sebastian Hölz

GEOMAR Helmholtz-Zentrum für Ozeanforschung Kiel

Wischhofstraße 1-3

D-24148 Kiel, Germany

Telephone +49 431 600 2519

Telefax +49 431 600 2915

E-Mail [shoelz@geomar.de](mailto:shoelz@geomar.de)

No of Scientists 11

## 8. Geographical areas in which ship will operate

(with reference in latitude and longitude)

Work is planned in working areas within a larger area, for which the company *North Tech Energy* (NTE) has been granted an exclusive exploration license in Spring 2017 by Orkustofnun. Since we envision our scientific work to be carried out in cooperation with NTE, we apply to operate the ship within the area outlined within the license and therefore ask to be granted a general permission to work in this area (see Fig. 1).

Currently, detailed work is planned in one main working area (WA1), where previous work was performed during several research cruises (POS524, POS229, POS253, POS291, POS524) by GEOMAR in the last year and in the late 1990s (Fig. 2, the inlay in the lower right (Hannington et al., *Marine Geology*, 2011) shows the main target within WA1).

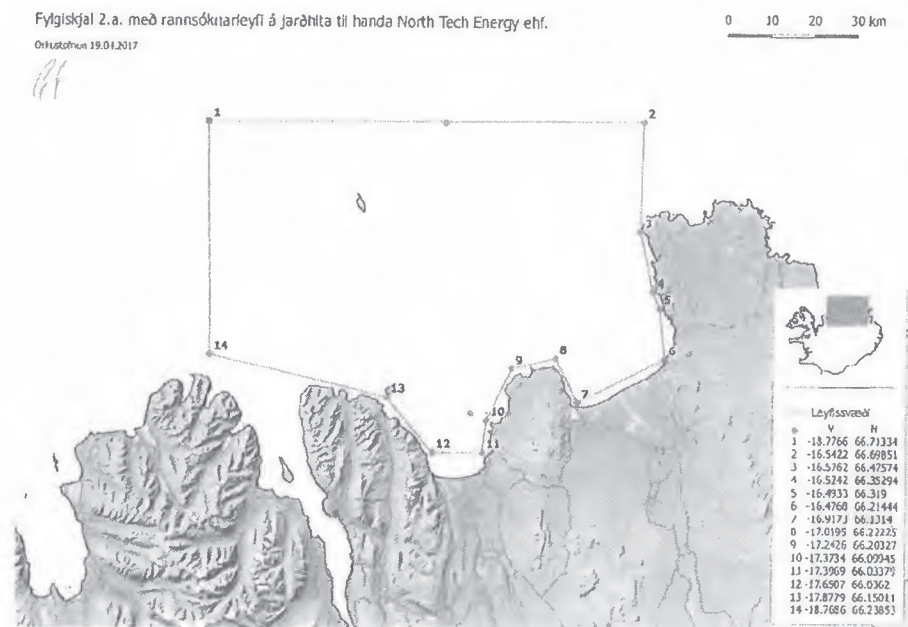


Fig. 1: Area around Grimsey Island covered by exclusive licence for hydrothermal exploration granted to NTE. Map is taken from the licence report. More detailed working program is described in Fig. 2.

Additional work may be carried out in a second working area (WA2) to the SW of Grimsey or in alternative working areas within the license area (see Fig. 1) to be determined in coordination with NTE.

Both work areas are located in the vicinity of the island Grimsey off the Northern coast of Iceland:

- WA1: 66° 33'N – 66° 38'N 17° 30'W – 17° 55'W
- WA2: to be determined in cooperation with NTE (possible outline in Fig. 2)

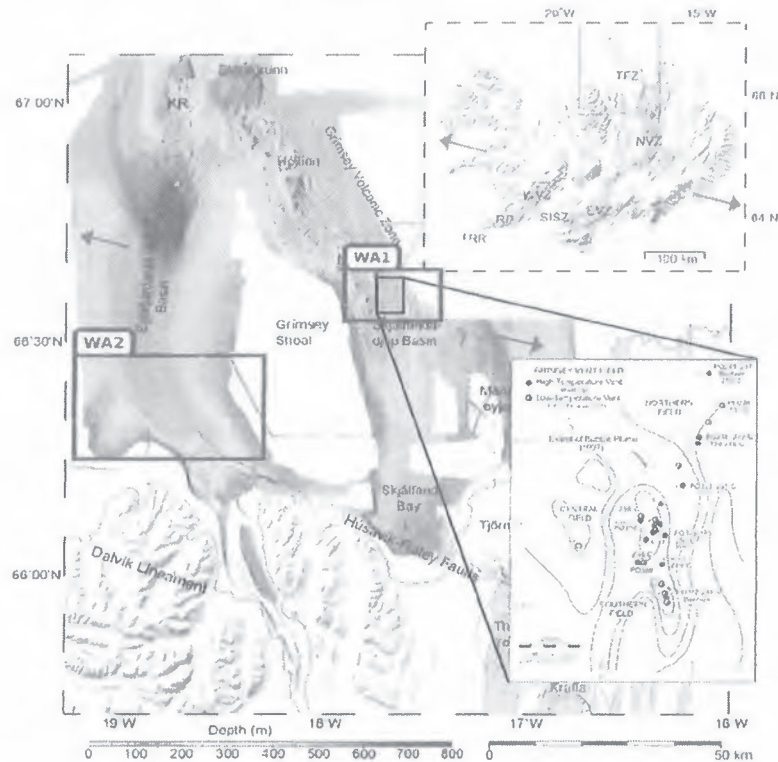


Fig. 2: Detailed overview map (Magnúsdóttir et al., Marine Geology, 2015) of proposed working areas (blue frames) within permit area outlined in Fig. 1. Working areas are located to the NE (WA1) and to the SW (WA2) of the Island of Grimsey (see inlay upper right). Investigations in working areas would be carried out in cooperation with „Northern Tech Energy“, who has recently been granted an exploration licence in this area.

We have also been in discussion with Geir Hagalinsson (NTE) and Bjarni Richter (ISOR – Iceland Geosurvey, Director Geothermal Energy), who suggested to carry out work around the Island of Eldey as outlined in Fig. 3. Coordinates for this working area are:

- WA3: 63° 35'N – 63° 52'N 22° 35'W – 23° 20'W

Thus, we also apply to work in this area.

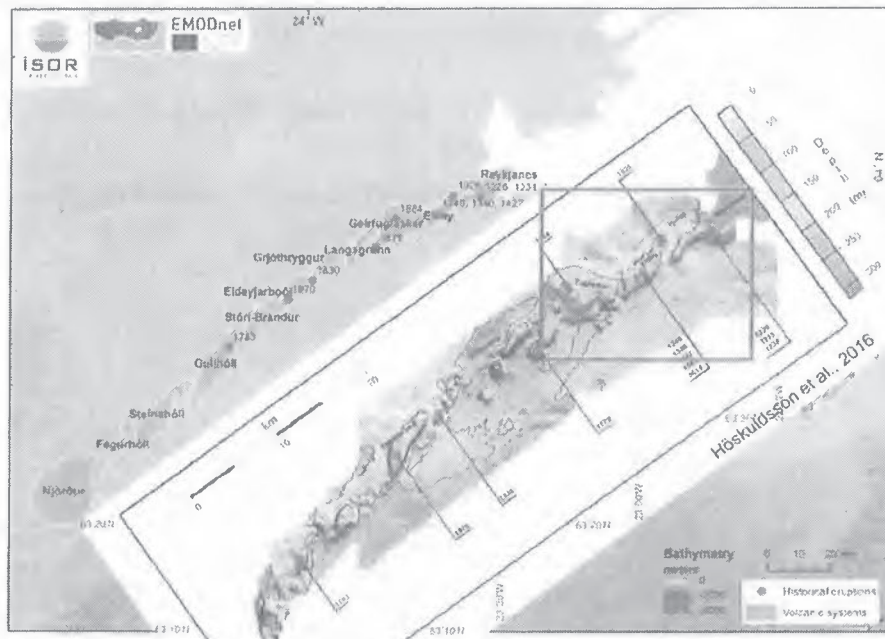


Fig. 3: Proposed working area WA3 (red square) around the Island of Eidey, which is located to the SW of Iceland.

### 9. Brief Description of Purpose of Cruise

Study of active hydrothermal systems in the vicinity of the Grimsey Vent Field and potentially to the SW of the island of Grimsey by means of electromagnetic (EM) methods. EM investigations will not only give insight into the hydrothermal structure, but could also reveal potential covered mineralizations at depth. EM investigations are to be accompanied by geophysical (heat probe) and geological (gravity core) measurements to aid the interpretation of EM data, for ground truthing and to gain further structural insight.

### 10. Dates and Names of Intended Ports of Call

Akureyri (Iceland) 7.6. - 9.6.2018 for 48 hours

### 11. Special Logistic Requirements at Ports of Call

None

## Part B – Details

### 1. Name of Ship

FS Poseidon, Cruise No. POS535

### 2. Dates of Cruise

9.6.2019 (Akureyri, Iceland) – 3.7.2019 (Bremerhaven, Germany)

### 3. Purpose of Research and General Operational Methods

Study of active hydrothermal systems in the vicinity of the Grimsey Vent Field and potentially to the SW of the island of Grimsey and to the SW of Iceland (Eldey) by means of electromagnetic (EM) methods. EM investigations will not only give insight into the hydrothermal structure, but could also reveal potential covered mineralizations at depth. EM investigations are to be accompanied by geophysical (heat probe) and geological (gravity core) measurements to aid the interpretation of EM data, for ground truthing and to gain further structural insight.

Additionally, CTD measurements in the water column are intended to constrain the acquired geophysical data.

### 4. Working Areas

Attach a chart showing (on an appropriate scale) geographical area of the intended work, positions of intended stations, tracks of survey lines, positions of moored / seabed equipment.

Work in workarea WA1 (see Fig. 2 for overview) is planned to be carried out in two stages:

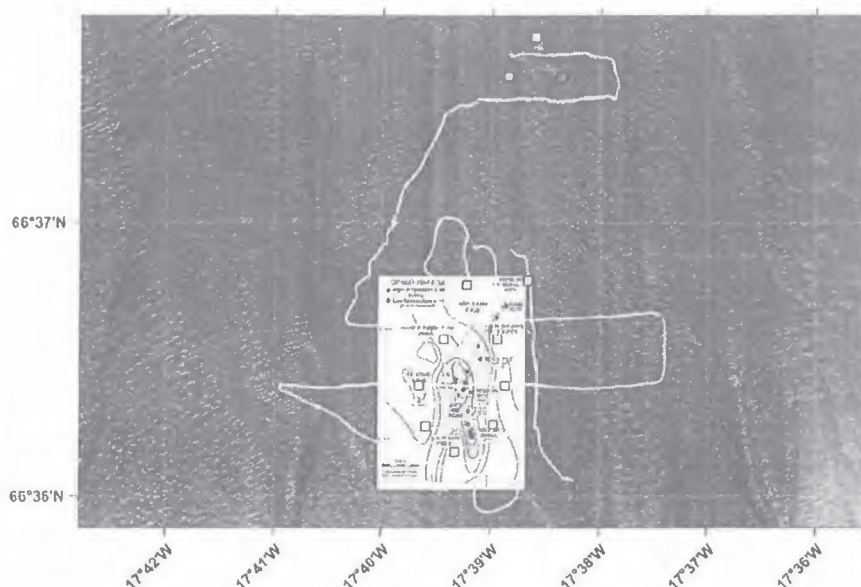


Fig. 4: Station map of the "local" experiment around the GVF with OBEM stations marked by squares and the white track line of the MARTEMIS coil system. The white inlay shows the map of Hannington et al. (2001).

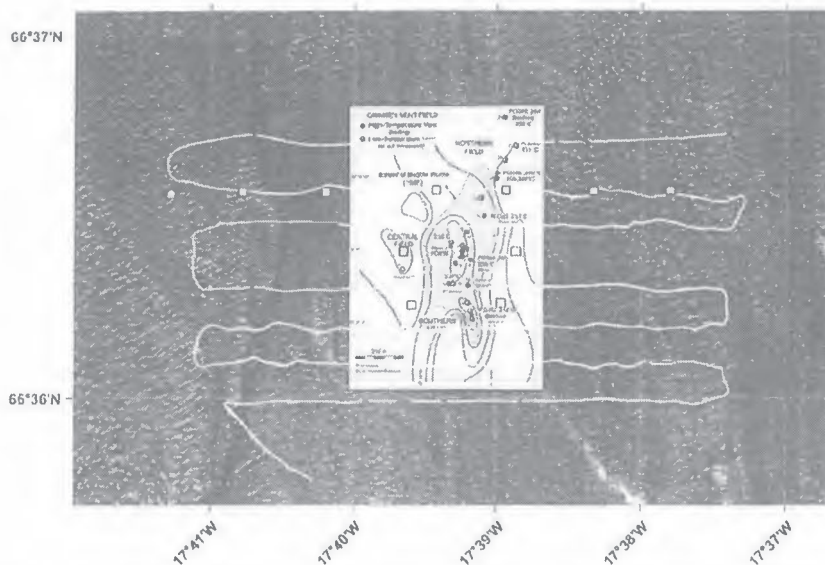


Fig. 5: Station map of the experiment along extended profile lines around the GVF with OBEM stations marked by squares and the white track line of the MARTEMIS coil system. The white inlay shows the map of Hannington et al. (2001).

1. Detailed work in the primary workarea WA1 (Fig. 4) will be carried out in the vicinity of the Grimsey Vent Field, which had previously been investigated by Hannington et al. (Marine Geology, 2001) and was also the target of our previous research cruise in 2018 (POS524). Since one of our scientific goals is to repeat 2018's measurements in order to see if we can detect temporal variations, station and profile lines are planned in the previous locations around the vent field (see Fig. 4).
2. To complement previous experiments, we would also aim to again measure along E-W profile lines to cover a large area around the field (similar to Fig. 5). To do this, OBEM receivers will be recovered and redeployed to the positions outlined in Fig. 5. Again, the exact positions of the receivers might need to be adjusted prior to the experiment. The experiment will then be carried out by flying a transmitter along profile lines across the structure (white lines). Depending on the progress of the experiments, additional profile lines might be added not exceeding the depicted rectangle by at most a few hundred meters (~ 1-2km) to all sides.
3. Additionally, work may be planned in cooperation with NTE and ISOR within the claim granted for exclusive hydrothermal exploration as outlined in Fig. 1 and Fig. 3. Detailed station planning would need bathymetric maps, which we do not have access to at the moment.

**5. Types of Samples Required** (e.g. Geological / Water / Plankton / Fish / Radioactivity / Isotope)  
**Methods of Sampling** (including dredging / Coring / drilling)

Gravity cores of a maximum length of 220cm length will be taken for the analysis of sediments and the pore fluids contained therein.

**6. Details of Moored Equipment**

OBEM stations will be deployed to the seafloor at the start of the cruise (June 6<sup>th</sup>) and will be recovered before leaving working areas around Iceland (20<sup>th</sup> of June). We do not intend to leave any equipment on the seafloor.

**7. Explosives**

No explosives or seismic sources will be used during this cruise.

## **8. Detail and reference of ...**

### **8.1. ... any relevant previous / future cruises**

The Grimsey Vent Field, main target within proposed working area WA1, has been studied during the following previous research cruises by GEOMAR with the research vessel FS Poseidon:

- POS229 (1997)
- POS253 (1999)
- POS291 (2002)
- POS524 (2018)

### **8.2. ... any previous published research data relating to the proposed cruise (attach separate sheet if necessary)**

- Atkins, D. & Audunsson, H., 2013: Exploration Techniques for Locating Offshore Geothermal Energy Near Iceland. Proceedings of the 38. Workshop on Geothermal Reservoir Engineering, Stanford University, 11-13.2.2013, SGP-TR-198.
- Botz, R., Winckler, G., Bayer, R., Schmitt, M., Schmidt, M., Garbe-Schönberg, D., Stoffers, P. & Kristjansson, J.K., 1999: Origin of trace gases in submarine hydrothermal vents of the Kolbeinsey Ridge, north Iceland. EPSL, 171, 83 – 93.
- Dekov, V., Scholten, J., Garbe-Schönberg, C.D. & Botz, R., 2008: Hydrothermal sediment alteration at a seafloor vent field: Grimsey Graben, Tjörnes Fracture Zone, north of Iceland. JGR, 113, B11101.
- Gudmundsdóttir, E.R., Eiriksson, J. & Larsen, G., 2011: Identification and definition of primary and reworked tephra in Late glacial and Holocene marine shelf sediments off North Iceland. J. Quat. Sci., 26, 589–602.
- Hannington, M., Herzig, P., Stoffers, P., Scholten J., Botz, R. Garbe-Schönberg, D., Jonasson, I.R., Roest, W. & Shipboard Scientific Party, 2001: First observations of high-temperature submarine hydrothermal vents and massive anhydrite deposits off the north coast of Iceland. Marine Geology, 177, 199 – 220.
- Lackschewitz, K.S., Botz, R., Garbe-Schönberg, D., Scholten, J. & Stoffers, P., 2006: Mineralogy and geochemistry of clay samples from active hydrothermal vents off the north coast of Iceland. Marine Geology, 225, 177 – 190.
- Magnúsdóttir, S., Brandsdóttir, B. Driscoll, N. & Detrick, R., 2015: Postglacial tectonic activity within the Skjálfandadjúp Basin, Tjörnes Fracture Zone, offshore Northern Iceland, based on high resolution seismic stratigraphy. Marine Geology, 367, 159 – 170.

## **9. Names and addresses of scientists of the coastal state in whose waters the proposed cruise takes place with whom previous contact has been made**

|                      |   |
|----------------------|---|
| Geir Hagalinsson     | Bjarni Richter  |
| North Tech Energy    | ISOR – Iceland Geosurvey (Director Geothermal Energy) |
| Tel:+354 5711711     | Telephone: +354 528 1526                              |
| Mobile: +354 8999780 | Mobile phone: +354 896 9336                           |
| E-Mail: geir@nte.is  | E-Mail: br@isor.is                                    |

## **10. State ...**

- a) ... whether visits to the ship in port by scientists of the coastal state concerned will be acceptable:  
Yes
- b) ... whether it will be acceptable to carry on board an observer from the coastal state for any part of the cruise and dates and ports of embarkation / disembarkation:  
Yes. We would require the observer to embark / disembark in Akureyri, Iceland.

c) ... when research data from intended cruise is likely to be made available to the coastal state and if so by what means:

- Cruise report three months after finishing the research cruise
- Scientific publication within the following three years

**11. Scientific Equipment – Coastal State: Iceland**

Complete the following table - SEPARATE COPY FOR EACH COASTAL STATE

|   |  |   |              |                   |                     |
|---|--|---|--------------|-------------------|---------------------|
| List of all major marine scientific equipment which is proposed to be used and indicate waters in which it will be deployed | Fisheries Research within Fishing Limits | Research concerning Continental Shelf out to Coastal State's Margin | Within 12 NM | Between 12 - 50NM | Between 50 - 200 NM |
|   |  |   |              |                   |                     |

| Coastal State: Iceland |    |    |     |     |    |
|------------------------|----|----|-----|-----|----|
| OBEM receiver          | No | No | Yes | Yes | No |
| MARTEMIS coil system   | No | No | Yes | Yes | No |
| Gravity coring         | No | No | Yes | Yes | No |
| Heat probe             | No | No | Yes | Yes | No |
| CTD Measurements       | No | No | Yes | Yes | No |

Dated: 06.12.2018

**GEOMAR**  
 Helmholtz Zentrum  
 für Ozeanforschung Kiel  
 (on behalf of the Principal Scientist)  
 Wischhofstraße 1-3  
 24148 Kiel