

*Acquisition of  
Seabed Massive Sulphide Data  
in the Norwegian Sea*



**NORWEGIAN PETROLEUM  
DIRECTORATE**

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**Scope of work:**

The NPD intends to acquire a variety of geophysical data that may be used in the exploration for volcanic massive sulphide deposits of extinct hydrothermal vents in the seabed of the Knipovich Spreading Ridge in the Norwegian Sea during early fall 2021. The survey shall consist of a set of semi-regional survey lines and some stations for seabed rock sampling using a remotely operated vehicle (ROV). The total cost shall be in the range of NOK 30 000 000 - 34 000 000 ex. VAT.

The survey is to take place along the central rift of the Knipovich Ridge within an area of coordinates 74.3955 N and 78.6492 N (download available shape-file from DOFFIN).

All coordinates above are provided in WGS84.

**1 Description of the assignment****1.1 Background**

The marine acquisition campaign described here is part of the NPD's programme for mapping the deep-sea mineral resources of the Norwegian Continental Shelf. The data acquisition program will be administered by the NPD, funded through the Ministry of Petroleum and Energy.

**1.2 Technical overview**

Based on experience from the NPD cruises in 2018 and 2019, we would expect a minimum of 3000 km AUV survey lines, and a large quantity of rock samples. The NPD will honour as much as possible of high-quality data within the budget.

The ship shall carry at least 3 fully operational AUVs. The data should be acquired by running 2 or more of the AUVs simultaneously, each mounted with these specified sensors:

- spontaneous potential data (SP)
- high resolution multi-beam bathymetry (preferably of Synthetic Aperture Sonar)
- back scatter data
- water column data
- grav/mag
- geochemical sensors, including pH, metan, turbidity, Redox
- sub-bottom profiler (SBP)
- temperature

Possible ways for combining these data with acquisition of Electromagnetic data (CSEM/MMT) would also be of interest. AUV sensor acquiring Induced Polarity (IP) may also be of interest.

In addition, geological samples are to be collected in areas of special interest. Samples shall be collected by use of ROV, which should be fitted with sampling equipment and storage. The ROV should be able to capture still images and videos of high resolution (HD-quality). Acquisition of water column data and currents should also be part of the programme.

The water depth of the survey area varies between 2400 and 3500 meters in general, with some peaks up to 1500 meters.

*Bidder is required to specify all relevant technical information to meet these intentions.*

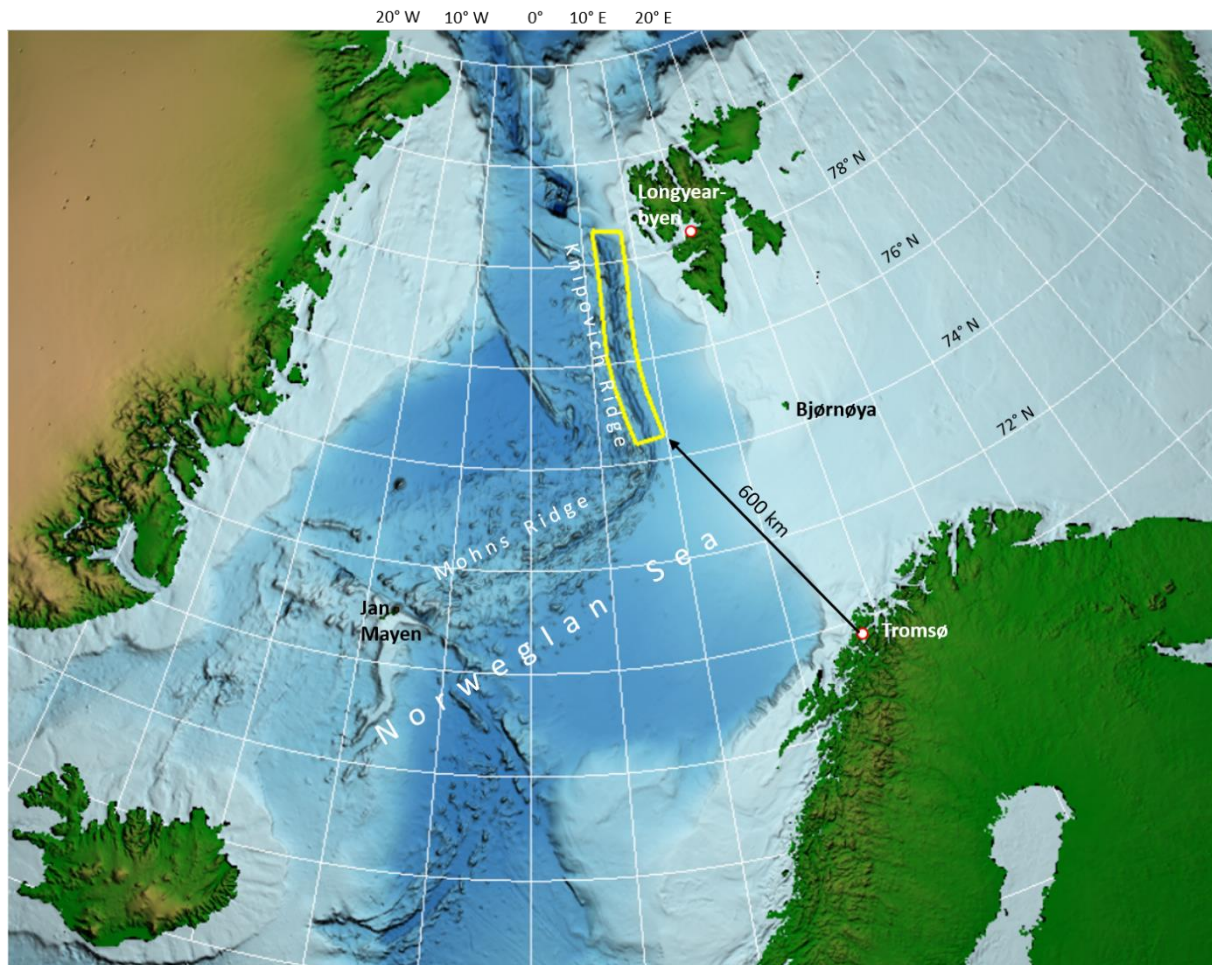


Figure 1 Regional overview map. Area of data acquisition is the axial parts of the Knipovich Ridge indicated by the yellow box.

### 1.3 Timing

The survey is expected to last approximately one month and shall be completed in the period July - September 2021.

*Bidder is requested to provide vessel availability meeting this survey period.*

### 1.4 Processing

Processing of all data types shall be in accordance with industry standards. Preferably, SP data should be processed onboard allowing the result to be made available as close to real time as possible in order to guide the ROV to promising dive sites.

### 1.5 Project time schedule

*The bidder is required to specify a table with a realistic project time schedule based on the scope and technical overview described above.*

## 1.6 Crew change

If possible, the survey should be a continuous survey without crew change during the survey. To achieve this, the date when the survey vessel is leaving harbour starting the project operations is expected to be the start-date for a leg (crew-change period).

*The bidder is required to comment on the need for crew-change during the project period.*

## 1.7 Client's representative

The NPD will have representative(s) on board for quality control, operational decisions and daily reporting to the NPD onshore.

The NPD representative(s) shall have access to all data during the survey, including preliminary information. The representative shall participate in the daily operational meeting with relevant personnel, as well as any planning meetings of relevance.

## 1.8 Navigation specifications

The survey vessel must have onboard navigation equipment necessary for its movement and ability to stay on location during rock sampling. The technical solutions available onboard will be evaluated.

*Bidder is required to detail all onboard navigation equipment and planned procedures during operations.*

## 1.9 Communication

There is need for continuous communication capabilities to shore. Phone and email communication shall always be available to assure that necessary information is delivered to the NPD and that decisions are taken without unnecessary delays.

This information shall include all relevant results and evaluations. A dedicated communication channel for this communication is preferred. In this regard the quality of the onboard communication will be evaluated.

If communication is hindered due to low capacity, the responsible on board shall take measures if needed. This might include selected availability.

*Bidder is required to detail all onboard communication equipment, including capacity for delivery and receipt of information.*

A daily report from the contractor shall be communicated to the NPD. This report shall cover the operation for the last 24 Hrs (midnight – midnight), morning activities and plan for the coming day.

## 1.10 Data delivery and final products

The contractor shall deliver

- all raw, measured, pre-processed, final processed and interpreted data
- all captured images and videos (HD-quality)
- generated maps of topography and sensor-images
- AUV and ROV tracks

A comprehensive field report shall be delivered within two months after demobilization. The field report shall include following appendixes:

- break down of time consumption.
- onboard QC and calibration of acquired data
- detailed documentation of AUV operations
- ROV dive report

For the AUV and ROV reports a description of each dive including operational time for descending, surveying, ascending and retrieval/downloading/maintenance shall be included. This should also be included as a total spreadsheet for all surveys. All spatial data (tracks, bathymetry etc.) must be correctly georeferenced with unambiguous coordinates and references (e.g. datum, projection etc.). These should be delivered both in binary (e.g. GeoTIFF) and human readable format (ASCII). The contractor shall deliver all rock samples to a storage facility or any other institution determined by the NPD immediately after the finalization of the assignment.

All data and other reporting from optional services must be delivered to the NPD within the same time schedule. After delivery of all data to and acceptance from the NPD, the contractor shall delete all the data from the contractor's and any third parties' databases. However, no data shall be deleted before a written statement from the NPD is given.

## **2 Costs**

### **2.1 General conditions**

The project is subject to funding from the Norwegian Government. The NPD therefore reserves the right to stop the bidding process or declare it null and void or reduce the volume of the programme due to budgetary reasons or unforeseen circumstances outside the NPD's control.

As full compensation to Bidder for satisfactory performance of the Services, the NPD shall reimburse Bidder in accordance with the rates and prices hereunder. Such rates and prices are in full and final settlement of all remuneration due to the Bidder for performance of the services, meaning:

- Prices stated by Bidder shall include all costs necessary to carry out the whole acquisition project.
- Costs shall be stated in NOK. Prices shall exclude VAT and shall remain fixed until completion of the work.
- All navigation costs shall be included in the day rates.
- All costs for communication to shore shall be included in the day rates.
- Costs of delivery of the samples and material to the NPD shall be included in the rates quoted for mob/demob, day rates and reporting.
- Costs related to equipment performance and acceptance tests shall be covered by the bidder.
- Food and lodging for the client's representatives shall be included.
- Fuel costs shall be included.
- Cost related to reporting shall be included.
- Costs related to Covid-19 shall be covered by the contractor.

The breakdown of timing regarding production and standby shall, on a daily basis, be agreed between the Party Chief and the NPD. The bidder's breakdown standards on this issue must be part of the tender documentation.

All downtime due to technical breakdown must be covered by the Bidder. *Bidder is required to state prices for all items in section 2.2-2.7.*

## **2.2 Mobilization and demobilization**

Mobilization and demobilization will take place in a port conveniently located with respect to suitable facilities and airline connections for the oncoming crew and representatives from the client. In this case, the port is expected to be Tromsø. In conjunction with the mobilization, a start-up meeting will be held with representatives from the NPD to provide hands-on information regarding the project to the crew and potentially to do a short vessel inspection.

Bidder shall specify the total cost for mobilization and demobilization related to the port in their bid. Mobilization and demobilization cost shall cover vessel, equipment and personnel costs associated with the mobilization and demobilization of this survey.

The costs shall be stated as lump sums.

For the sake of clarity, the mobilization period will be regarded as finished when the vessel(s) and all equipment, personnel, infrastructure, spare parts and consumables of the Bidder departs from the port of mobilization and starts transiting to the first survey location.

The demobilization is regarded as finalized when the vessel has transited to and arrived at the agreed port after finalization of the survey.

## **2.3 Transit rate**

The Bidder shall quote a transit rate (per day – 24 hours) related to the transit time from port of mobilization to the area where work is planned to commence, and to the specify expected time for such transit.

The transit rate will relate also to movement of vessel between survey lines, and to the transit from the working area back to port for demobilization.

## **2.4 Operational rate**

Operational rate will apply when the Bidder's equipment and personnel are conducting the survey services to be rendered by the Bidder and shall be quoted per day (24 hours).

Operational time is classified as time spent on:

- Preparation for acquisition of data and/or sampling operations
- Acquisition of data operations
- Sampling operations
- Recovery of equipment after ended acquisition and/or sampling operations

The following costs shall be included in operational day rate stated:

- Costs for logistical acquisition/sampling planning.

Use of other optional equipment proposed by contractor may be quoted as “other equipment and services offered by contractor” and quoted as lump sum and daily rental (applies when equipment is in use).

## **2.5 Standby rate**

Standby rate shall be stated as rate per day (24 hours).

Standby time is classified as time spent on:

- Waiting on weather.
- Waiting due to circumstances beyond Bidder’s control.

## **2.6 Cost associated with crew-change**

Reference is made to pt. 1.6. In case of need for crew change during the project period, the Bidder shall specify the associated cost. This can be done either by specifying a total sum associated with crew-change during the project, or by a day-rate and associated time expected for the crew-change.

## **2.7 Cost for optional equipment**

Cost for any optional services shall be detailed for the relevant tools or packages of tools. This cost shall include personnel, equipment, operation cost, reporting etc.

The cost for the different tools should be specified for:

- Mobilization/demobilization of the equipment and personnel involved
- Day rates (24 hrs) for the full project duration for personnel and equipment
- Operational rates (24 hrs) for the time of actual operations of the logging tools

## **2.8 HSE**

- The contractor shall describe procedures for risk assessments.
- A Covid-19 contingency plan should be presented.

## **2.9 Other matters**

- Costs related to lost or damaged equipment shall be carried by the contractor. The contractor shall cover insurance for all crew and sub-contractors, except NPD participants who will be covered by the NPD.
- All relevant agreements with sub-contractor(s) and other partners shall be declared to the NPD.
- The contractor should be aware of international regulations for operating in the arctic region (such as the Polar Code).