Project information

Keywords
Mining, seadeposit, benthos, metals, radionuclides, tailings
Project title
Fate and Impact of MIne Tailings on marine Arctic ecosystems – FIMITA
Year
2015
Project leader
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Participants

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Flagship
MIKON
Funding Source

MIKON - research theme 2: "Impacts of industrial activity on organisms, habitats and ecosystems" and research theme 3: "Impacts of industrial development on ecosystem services and social-ecological systems in the North".

Summary of Results

A close collaboration between the Environmental Waste Management Program (EWMA) and FIMITA has been established in 2015. This will benefit both projects and hopefully result in several joint publications.

WP 1: Fieldwork was performed in early June. Bathymetry and backscatter data was obtained by Seisma. These data provided a picture that delineates the successive filling on the seafloor along the western side of the southern inlet of Repparfjorden and it shows how the outlet point has been moved towards north-east (see enclosed figure). A light-seismic profile (black line in figure) was obtained along the deposit. Core sampling turned out to be very difficult at the old deposit, due to a very hard layer at ca. 20 cm depth. However, NGU was able to obtain samples of surface sediments (0-20 cm depth) in several locations, and to sample sediments and pore water from a 60 cm core taken from a location close to the foot of the deposit (samples from EWMA). In addition, "background" samples have been obtained of floodplain sediments in the Repparfjordelva. Also fresh tailings, produced within the project, has been analyzed for metals

and radionuclides.

WP 2: The benthic community was sampled as planned at various distances from the old deposit, and in a reference area in June 2015. In 2016 these samples will be sorted and all faunal taxa identified to species level. An in situ recolonization experiment is in progress in Repparfjord. Experimental bottom frames were filled with manipulated sediments and placed on the seafloor in early June. Three different treatments (varying thickness of tailings) were used, plus one control group. The frames will be retrieved in the end of November. All macrofauna from the boxes retained on a 1 mm sieve will be sorted and identified to species level (during 2016), and biomass measurements conducted.

WP 3: Due to logistical challenges and uncertainty around the production from Sydvaranger no fieldwork was performed in Bøkfjorden. The experiment with hardbottom fauna that originally was planned there was moved to IMRs research facilities at Austevoll. Fauna of the selected model taxa were available at IMR's research station in Austevoll. Therefore, a laboratory exposure study using suspended mineral particles is in progress (started beginning of November, end in mid-December 2015).

WP 4: In 2015 the debates on mining in Kvalsund and Kirkenes were mapped using literature study of media, reports and government documents. The main statements in the two cases were identified as a basis for Q-studies. Q-methodology is a method used to identify the different opinions, or perceptions, on a topic in a population of stakeholders. The first step is to map the debate on a topic, in this case the mining operations in Finnmark. The core elements in the debate are identified and short statements representing the debate are selected for the Q-sort. These statements are called "Q-statements". The Q-statements are presented to stakeholders who have to sort the statements (do a Q-sort) according to how much they emphasise that statements and if they agree or disagree. The Q-sorts of the different stakeholders are analysed to identify the main perceptions and agreements/disagreements between the different perceptions on the topic studied. Field work was conducted in Kirkenes, where 13 local informed stakeholders sorted the 43 Q statements identified in Kirkenes for the Sydvaranger mining operations according to normal distribution. The

stakeholders also commented on the statements. This gave the basis for both a Q-analysis and qualitative data that can inform the results.

For the Management

FIMITA will produce new knowledge about effects of subsea mine tailing deposition on marine habitats and their ecosystems. As such deposits are present already in Northern-Norway and new ones are planned, knowledge about environmental impacts of mine tailings is highly demanded by environmental managers, NGOs and the public. It is also important for environmental managers to know how ecosystem services and local communities are affected by mining activities, and this will also be investigated in FIMITA.

Published Results/Planned Publications

No manuscripts have been submitted in this first year of the project, since few samples have been analysed so far. Several publications are planned for the coming two years (work-titles given below):

1. Recolonisation of benthic communities at a sub-sea tailing deposit; a case study from Repparfjorden, Norway.
2. Metal speciation and mobilization from a sub-sea tailing deposit.
3. Physiological stress responses in hard-bottom communities exposed to mine-tailings.
4. Cellular stress responses in hard-bottom communities exposed to mine-tailings.
5. Assessment and risk perception by the local population of ecosystem service effects from STDs.

Communicated Results

Since this year has been focused on fieldwork and sampling no results have been communicated so far.

Interdisciplinary Cooperation

FIMITA is a truly multidisciplinary project. The research team has expertise within sediment geology, geochemistry, ecology, ecotoxicology, economics and planning studies. During the first year much focus has been on fieldwork and thus samples collection. The two coming years will mainly be dedicated to sample

analyses and data treatment, and in this phase data integration between the different science disciplines will be very important.

Budget in accordance to results

The Fram Centre funding is essential for this project. The subject has not been covered by NFR programs, and therefore other funding is difficult to obtain.

No other funding provided.

Could results from the project be subject for any commercial utilization

No

If Yes

No commercial products.

Conclusions

a) **Future research and/or perspectives which the project results have led to:**

Too early in the project to assess this.

b) **List and describe new methods or techniques that have been developed during the project or that the project has revealed a need for:**

Improved bottom-frames for experimental work with benthic communities has been developed.