

Sedimentological and geochemical record of submarine mine tailing footprint in Repparfjorden (Northern Norway)

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The knowledge on understanding the physical, chemical and biological processes dominating in marine system affected by submarine tailings disposal (STD) remains limited and further knowledge to make reliable long-term predictions of future environmental impacts is needed. One way of contributing to this is by investigation of marine environments already affected by the tailings discharge in the past.

We present preliminary results from a multidisciplinary study of marine sediments from Repparfjorden in northern Norway, a fjord that was influenced by the deposition of tailings from a copper mine during the 1970's. The study is a part of the competence cluster Environmental Waste Management (EWMA) that as one of its important aims has advancing the knowledge of spreading of mine-tailing related contaminants. Here we give particular attention to the reconstruction of sedimentation style, rate of sediment accumulation, as well as potential sediment transport paths (contaminants dispersion).

Seventeen short cores (up to 21 cm long) were retrieved from sites covering the entire area of Repparfjorden. The cores were sliced into 1-cm intervals that are and will be analysed for grain-size, concentration of heavy metals and total organic carbon content of bulk sediment. Sediment chronologies are and will be derived using ^{210}Pb and ^{137}Cs dating techniques.

An approximately 7-cm thick interval which is different from present fjord sedimentation was observed below c. 10 cm depth in three of the cores retrieved from the area of tailings deposition in the 1970's. Sediments of this discrete depth interval are mainly composed of mud or sandy mud with bimodal grain-size distribution (first mode: medium silt fraction; second mode: very coarse silt). They are characterised by very high Cu concentrations (>250 mg/kg). Preliminary measurements of the ^{210}Pb activity indicate an increase in sediment accumulation rate during the deposition of this interval. Therefore, we interpret it to be mainly composed of mine tailing sediments. As this sediment interval was only observed in 3 of 17 cores, we suggest that the lateral extent of the tailings is restricted to a relatively small area of the fjord. However, elevated concentrations of Cu (40-80 mg/kg) were also detected in a discrete sediment interval (3-10 cm) in one core ~3 km beyond the tailing deposition site. In addition, high Cu concentrations (60-190 mg/kg) in sediments between the seafloor and the tailing deposit, as well as some centimetres below the deposit (in all cores from the old tailing deposition site) suggest possible dispersion of Cu to the immediate surrounding sediments in the cores.