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Mining impact on arctic fjord sediments, central west Greenland

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The Black Angel Mine located 500 km north of the arctic cycle in central West Greenland is one of the richest zinc mines in the world. During its operation from 1973 to 1990 approximately 11 million tones of ore were mined. The residuals of this mining process, called tailings, were discharged into the small Affarlikassaa Fjord and caused an evident pollution of the fjord environment. In summer 2008 the Black Angel Mine will be reopened by the Canadian mining company Angus Ross. On these background further investigations of the mining impact on the fjord system is essential.

Undisturbed surface sediments were taken with a giant box-corer and a multi corer on a E-W transect from the centre of the Affarlikassaa to outermost part of the Qaumarujuk Fjord during an R/V “Maria S. Merian” cruise in June 2007. The aim of this study is to investigate the heavy metal contamination of fjord sediments in the vicinity of the Black Angel mine 17 years after its closure. Analyses of heavy metals Pb, Zn, S, Cd and As have been conducted with ICP-OES, total mercury measurements have been carried out as well as analyses of stable lead isotopes. Age models from selected sediment cores are based on Pb-210 and Cs-137 dating.

Results from a sediment core taken close to the mine indicate between 8 and 16 cm core depth a layer with approx. 1 % zinc and 0.7 % lead contents, showing the mining impact. In the surface sediments of this core site a distinct decrease of heavy metal

contamination with revealing values to 1000 ppm zinc and 600 ppm lead is found. Hence the maximum impact on the fjord sediments is identified within the Affarlikassaa Fjord. With increasing distance from the mine along an E-W transect the impact factor of the mine activity is decreasing. In 30 km distance to the mine no impact on the sediments was detectable.