Wilhelmsburg - one of the largest river islands in Europe
Does it still hold the memory of an industrial history in the sediments?

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Introduction:
Wilhelmsburg is one of Europe's largest river islands and the biggest district of Hamburg with an area of 35.3 km² and about 48000 inhabitants. Industrial legacies, active industrial facilities, agricultural land, nature protection areas, urban sites, small trades and allotments are all found within a relatively small area. In the North East, Europe's largest producer of copper is located. The disposal site "Georgswerder" has been famous for its hazardous waste, but has now been contained. An oil refinery is found in the western part of the island. Depositing sites for dredged material are in North East. In contrast to the industrial use, the island has a number of very rare freshwater mudflats of high environmental value which together with extensive grasslands and allotments are important recreational sites.

Methods:
Over 2,5 years, sediment and suspended particulate matter (SPM) was sampled frequently in different canals running through agricultural, urban and industrially used sites, especially after strong precipitation. Sampling of SPM and sediment in freshwater mudflats was initiated by high water discharges of the Elbe River. Ecotoxicological and chemical analysis were performed. Fish was sampled in canals and close to the mudflat in order to investigate bioaccumulation of contaminants.

Results and Discussion
SPM from the canals showed partly very high concentrations in metals, which reflected the and the characteristics of their catchment: As was very high (>1000 mg/kg) in SPM close to the copper smelter, and points to the carelessness of copper production in former times, releasing a lot of arsenic into the environment. Cu and Pb were high in industrially used areas and especially close to roads that are intensively used by cars and heavy trucks. Ecotoxicologically, however, very little response was measured by algae growth inhibition and biotest with bacteria (sediment contact test and luminescence bacteria test). Elevated responses, however, were provoked by samples from canals with strong agricultural influence. These samples also showed increased concentrations of organic contaminants like pesticides in water (Stachel et al., in prep) above the EQN. With regard to the biotests used, the agriculturally influenced sites seem to be of more concern than the historic industrial impact. No impact of increased precipitation was noticed, and hence no specific importance of surface water run-off.

The freshwater mudflat, Heuckenlock, showed elevated concentrations of Hg in sediment which may be a left-over from the formerly highly Hg-contamination of the Elbe River or from an internal source, which currently cannot be answered. Slightly elevated concentrations of PAH, HCB and HCH were found in SPM after high water discharges of the Elbe River which corresponded to a flood event with a 20-years frequency.

Biota-EQN for Hg and HCB were exceeded by almost all fish that were captured in the canals and in the Elbe River in close proximity to the freshwater mudflat. Whether the accumulation is due to the fish feeding in the mudflat or due an exposure from the Elbe River, however, cannot be answered at this point.