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## Enrichment of trace metals from acid sulphate soils in sediments of the Kvarken Archipelago, eastern Gulf of Bothnia, Baltic Sea

Joonas Virtasalo<sup>1</sup>, Peter Österholm<sup>2</sup>, Aarno Kotilainen<sup>1</sup>, and Mats Åström<sup>3</sup>

<sup>1</sup>Marine Geology, Geological Survey of Finland (GTK), Espoo, Finland (joonas.virtasalo@gtk.fi)

<sup>2</sup>Department of Geology and Mineralogy, Åbo Akademi University, Turku, Finland

<sup>3</sup>Department of Biology and Environmental Science, Linnaeus University, Kalmar, Sweden

Rivers draining the acid sulphate soils of western Finland are known to deliver large amounts of trace metals (e.g. Al, Cd, Co, Cu, La, Mn, Ni and Zn) with detrimental environmental consequences to the recipient estuaries in the eastern Gulf of Bothnia, northern Baltic Sea. However, the distribution of these metals in the coastal sea area, and the relevant metal transport mechanisms have been less studied.

This study investigates the spatial and temporal distribution of metals in sediments at 9 sites in the Kvarken Archipelago, which is the recipient of Laihianjoki and Sulvanjoki rivers that are among the most acid sulphate soil impacted rivers in Europe. Metal contents increase in the studied cores during the 1960s and 1970s due to the intensive artificial drainage of the acid sulphate soil landscape. The metal deposition has remained at high levels since the 1980s and the metal enrichment in seafloor sediments is currently visible at least 25 km seaward from the river mouths. Comparison to sediment quality guidelines shows that the metal contents are very likely to cause detrimental effects on marine biota more than 12 km out from the river mouths. The dynamic sedimentary environment of the shallow archipelago makes these sediments potential future sources of metals to the ecosystem. Finally, the strong association of metals and nutrients in the same sediment grain size class of 2–6 µm suggests that the transformation of dissolved organic matter and metals to metal-organic aggregates at the river mouths is the key mechanism of seaward trace metal transport, in addition to co-precipitation with Mn-oxyhydroxides identified in previous studies. These findings are important for the estimation of environmental risks and the management of biologically-sensitive coastal sea ecosystems.

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