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Sulphate soils and the abundance of metals in the surrounding water - a case study from Halland, SW Sweden.

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Acid sulphate soils (AS soils) are in literature described as the “nastiest soils in the world” (Dent & Pons, 1995 pg.1) affecting swathes of land around the globe. The changed oxygen conditions in the soil as a result of altered ground water levels, causes a severe decrease in pH, consequently enabling metals to leach out to recipient water streams (e.g. Åström, 2001). In northern Scandinavia, several fish kills have been reported due to leaching AS soils (e.g. Hudd and Kjellmann, 2002) allowing for these areas to be the focal point of prior investigations (e.g. Nordmyr et al., 2008; Lax, 2005; Åström, 2001). However, seasonally lowered local groundwater levels caused by altered temperature and precipitation pattern in Scandinavia increases the need for additional research in southern Scandinavia. Therefore, this study investigates the impacts of AS soils on water chemistry in Halland, SW Sweden; an area previously covered by the Littorina sea. In order to estimate potential metal emissions after a period of low groundwater levels, in situ surface water sampling was conducted from smaller ditches draining an active AS soil into a nearby canal. Additional hydro-chemical parameters, such as pH, redox potential and electric conductivity were simultaneously measured in situ and groundwater data from nearby wells were retrieved. The concentrations of several metals, such as Al, Cu, Fe and V were analysed using an inductively coupled plasma mass spectrometry (ICP-MS) instrument and the total organic carbon (TOC) in the samples were determined. The results provided a clear indication of leaching acids to the surface water, through elevated concentrations of numerous metals, along with a pH of 3.82 - 6.64 in the surface water. Several metals such as Al and Mn, were highly elevated, in some cases close to 100 times higher than the background levels. No signal was found in the groundwater data retrieved, presumably due to the great difference in depth between private wells and the AS soil layer.

Sources:

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