

WE177 Influence of soil physicochemical properties on the depth profiles of perfluoroalkylated acids (PFAAs) in soil along a distance gradient from a fluorochemical plant T. Groffen, Systemic

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Perfluoroalkylated acids (PFAAs) have been produced for over five decades. Their hydrophobic and lipophobic character makes them suitable for a wide range of applications. PFAAs may enter the environment where they accumulate and may cause detrimental effects. The widespread use of PFAAs has led to a global presence. As a result, the major global manufacturer, 3M, phased-out the production of perfluorooctane sulfonate (PFOS) and perfluorooctanoic acid (PFOA) in 2002. Despite these regulatory measures, these compounds can still be detected in high concentrations in the environment and biota. The fluorochemical plant near Antwerp has been characterized as a PFAAs hotspot of environmental contamination. In the present study, we investigated how 15 PFAAs (11 perfluoroalkyl carboxylic acids (PFCAs) and 4 perfluoroalkyl sulfonic acids (PFSAs)) were distributed in different soil layers collected at three sites representing a distance gradient from a fluorochemical plant. Additionally, we examined correlations between multiple physicochemical properties of the soil (temperature, pH, clay content and total organic carbon (TOC)) and the PFAA concentrations in the soil layers. Finally, we tested the correlations between PFAA concentrations and microbial activity, microbial biomass and soil respiration in the top layer at five sites, along the same gradient. The only compounds that were detected in more than 50% of the soil samples were PFOA and PFOS. In the top layer, PFOS concentrations were positively correlated with pH and increased up to 2km away from the plant. Hereafter concentrations decreased. Similarly, PFOA concentrations were also positively correlated with pH and decreased at sites further than 2km away from the plant site. Soil temperature was not correlated with concentrations of PFOA or PFOS in the top layer. Soil respiration was positively correlated with PFOS concentrations, whereas microbial activity was not correlated with both PFOS and PFOA concentrations. The outcome of this study will provide more information on the factors that might affect sorption of PFAAs to soils and the potential effects of PFAAs on microbial communities in soil.