Magnetic pollution mapping in Flanders

Ynse Declercq[a,b,*], Roeland Samson[b], Filip M. G. Tack[c], Philippe De Smedt[a]

[a] *Research Group Soil Spatial Inventory Techniques, Department of Environment, Ghent University, Coupure Links 653, 9000 Ghent, Belgium*
[b] *Laboratory of Environmental and Urban Ecology, Department of Bioscience Engineering, University of Antwerp, Groenenborgerlaan 171, 2020 Antwerp, Belgium*
[c] *Laboratory of Analytical Chemistry and Applied Ecochemistry, Department of Green Chemistry and Technology, Ghent University, Coupure Links 653, 9000 Ghent, Belgium*

The impact of air pollution is increasingly assessed by targeting the magnetic properties of combustion-related particulate matter (PM). Following airborne emission, these particles deposit onto the earth's surface where soil and vegetation magnetic records readily reveal historical and recent pollution patterns. However, as the preservation of magnetic particles on these receptors is affected by PM deposition processes, plant species, local geology, plant cover and land use, the interpretation of magnetic data is not straightforward, especially when large areas with high local variability are surveyed. Therefore, the application potential of combined soil and vegetation magnetic mapping in Flanders is to be evaluated. Here, we investigate the PM pollution impact near the Ghent harbor area. Although robust topsoil magnetic records reveal a clear pollution pattern in forested area, land use strongly influences the dispersal of magnetic particles through soil. This impedes topsoil records to delineate large-scale magnetic footprints and necessitates additional downhole magnetic measurements to facilitate interpretation. Vegetation magnetic data are hard to interpret due to complex PM deposition processes and the influence of plant species. However, the uncovered pollution pattern is distinct from the soil magnetic pattern, possibly reflecting recent changes in PM emission and suggesting promising potential of combined soil and vegetation magnetic monitoring in Flanders.