



200 years of soil carbon nitrogen and phosphorus change across the United Kingdom

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Human intervention over the last 200 years has resulted in vast changes to the fluxes of nitrogen (N) and phosphorus (P) entering the United Kingdom's landscape. Industrialisation has resulted in N deposition, agricultural intensification has seen widespread use of N and P fertilizers and societal actions have resulted in extensive land use change. To understand the consequences of these anthropogenic inputs for our soils, freshwaters and ecosystems it is necessary to take an integrated long term large scale approach. Integration across the compartments of the critical zone – from atmosphere, plants to soil and stream - is necessary in order to trace the effects of deposition, fertilization, cultivation and land use change. Coherent integration of C, N and P dynamics is also crucial, as biological processes tightly couple these cycles, so that in unison C N and P control the generation of biomass and consequent production of soil organic matter, having knock on effects for dissolved and particulate fluxes and ecosystem function.

The Long-Term Large-Scale (LTLS) project is developing an integrated model that simulates the pools and fluxes of carbon, nitrogen and phosphorus (C, N, and P) between atmospheric, vegetation, soil and aquatic systems for the whole of the United Kingdom for a period spanning from the onset of the industrial revolution up until the present day. In this paper we will present results demonstrating the changes in the soil macronutrient cycles in response to agrarian and social change in the United Kingdom over the last 200 years