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# Local vs. global drivers of vegetation changes in the herb layer of a temperate forest over the last four decades

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## Abstract

Biodiversity changes are inherent to natural communities, but human activities and global change are increasingly acknowledged as speeding up compositional changes. In this respect, resurveys of historical vegetation plots provide valuable insights into vegetation changes. Here, we resurveyed 78 semi-permanent plots in the forest of Compiègne (Oise, France) fifty years after a first survey, to test the following hypotheses: (1) Local colonization and extinction events increased similarity between plots over time; (2) The magnitude of changes varies according to the soil type and silviculture intensity; (3) The observed vegetation changes can be explained by a combination of global and local factors. The paired (old *vs.* new) relevés were distributed among four soil types (luvisols, cambisols, gleysols, podzols) and, for luvisols only, among two management types (intensive silviculture *vs.* no management). Beside the 156 relevés x 228 taxa data matrix, we built a species x trait matrix to infer some processes behind the observed patterns. We implemented a set of multivariate and univariate statistics to test our three hypotheses. We evidenced strong directional biodiversity changes among plots, which exhibited increased species richness and composition homogeneity (H1). The luvisols showed the lowest changes compared to the other soil types, but these changes were greater in reserves than in managed plots (H2). "Winners" were mostly nitrogen-demanding species, shade-tolerant species, graminoids, ferns and woody saplings, suggesting that forestry vehicles and increased canopy density as local factors, together with atmospheric nitrogen deposits as a global factor, were the main drivers of observed changes (H3).

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